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OMEGA SIGNAL COVERAGE PREDICTION DIAGRAMS FOR 10.2 KHZ. VOLUME --ETC(U)
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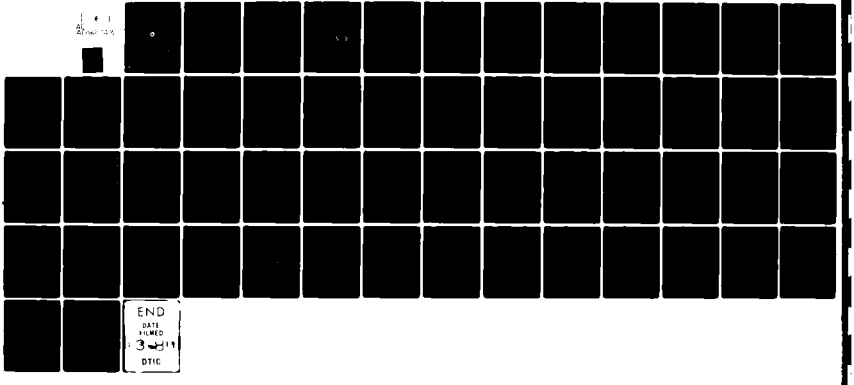

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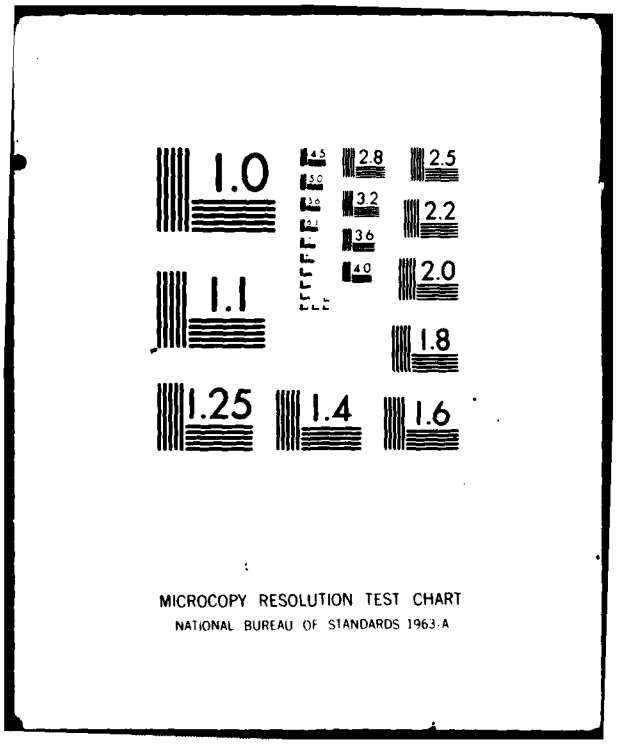
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

LEVEL III

(6)

(10)

OMEGA SIGNAL COVERAGE PREDICTION DIAGRAMS FOR 10.2 kHz.

VOLUME III. COMPOSITE DIAGRAMS.

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Paul M./Creamer
Suzanne/Sayer

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(11) October 1980

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(15) DOT-CG-951480-A

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UNITED STATES COAST GUARD
Omega Navigation System Operations Detail
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NOTICE

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15. Supplementary Notes

16. Abstract

Individual Omega station and composite (Omega Navigation System) 10.2 kHz signal coverage prediction diagrams have been developed for eight times. The diagrams show the global accessibility of "usable" 10.2 kHz signals at eight fixed diurnal/seasonal times for two usable signal access criteria. Criterion I requires: signal-to-noise ratio (SNR) $\geq$ -20 dB (in a 100 Hz noise bandwidth) and $\Delta\phi \leq$ 20 centicycles (cec), where $\Delta\phi$ is the modal interference-induced phase deviation in the signal phase relative to the reference signal phase. Criterion II differs from Criterion I in that the SNR $\geq$ -30 dB. Volume I presents the diagram development methodology and contains individual station nighttime modal interference diagrams. Each modal interference diagram identifies regions throughout the world where $\Delta\phi \leq$ 20 cec for nighttime propagation conditions.

Volume II presents 64 individual Omega station diagrams (Mercator projection): eight selected coverage times for each of eight stations. Each diagram displays the SNR and $\Delta\phi$ contours for a designated signal access criterion and coverage time.

17. Key Words	18. Distribution Statement
OMEGA Very Low Frequency Propagation Omega Signal Coverage Diagram Omega Modal Interference Diagram	Document is available to the U.S. public through the National Technical Information Service Springfield, Virginia 22161

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16. ABSTRACT (Continued)

Volume III contains 48 composite coverage diagrams which embody the eight coverage times, two signal access criteria, and three different projections (North and South pole centered Azimuthal Equal Distance, and Mercator). Each diagram displays the global accessibility of usable signals from the system for a designated signal access criterion and coverage time.

Volume IV tabulates the bearing angles of great circles to each Omega station. These angles are computed at latitude/longitude grid points having a uniform spacing of four degrees.

PREFACE

This volume contains 48 composite (full system) 10.2 kHz signal coverage prediction diagrams: eight selected coverage times (0600 and 1800 GMT in February, May, August and November) for each of two usable signal access criteria and three cartographic projections. The two criteria are based on threshold values of signal-to-noise ratio (SNR) and modal interference-induced deviations in the signal phase ($\Delta\phi$). Both criteria require $\Delta\phi \leq 20$ cec (centicycles). Criteria I and II require SNR $\geq$ -20 dB (decibels) and SNR $\geq$ -30 dB, respectively.

The composite diagrams display the global accessibility of usable 10.2 kHz signals from the full system (all Omega stations) at a selected time based on one of the two signal access criteria. The composite coverage at each selected time is displayed in a Mercator projection and in two Azimuthal Equal Distance (AED) projections, centered at the North and South Pole. In each diagram, the combination of signals that can be accessed in a region is indicated by the set of letters within the contours enclosing the region. For example, in the composite diagram shown on page 1, the expected coverage in Iceland is from stations A, B, D, F and H. Some regions display a number indicating the number of signals that can be received in that region. These stations, however, can be readily determined as each coverage contour is labeled with a station designator and an arrow in the direction of the accessibility of the usable signal from the labeled station. For example, the region around the Norway station in the diagram shown on page 1 is labeled with a 6. Coverage in this region is from stations B, C, D, E, F and H. The coverage diagrams also indicate (with shading) areas with at least three usable signals, but where all possible combinations of three signals yield a geometric dilution of precision which is above the prescribed threshold value of one kilometer of radial position error per centicycle of line-of-position phase error.

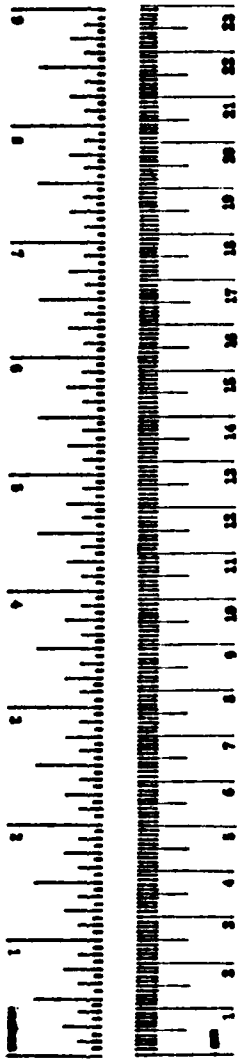
In all diagrams, the receiver noise bandwidth is assumed to be 100 Hz and the radiated power of each transmitting station is taken to be 10 kW. The key for locating a composite coverage diagram at a selected time and signal access criterion is given in the Table of Contents.

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

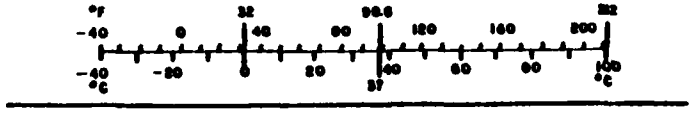


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TABLE OF CONTENTS (Continued

-20 dB SNR	FEBRUARY	0600 GMT

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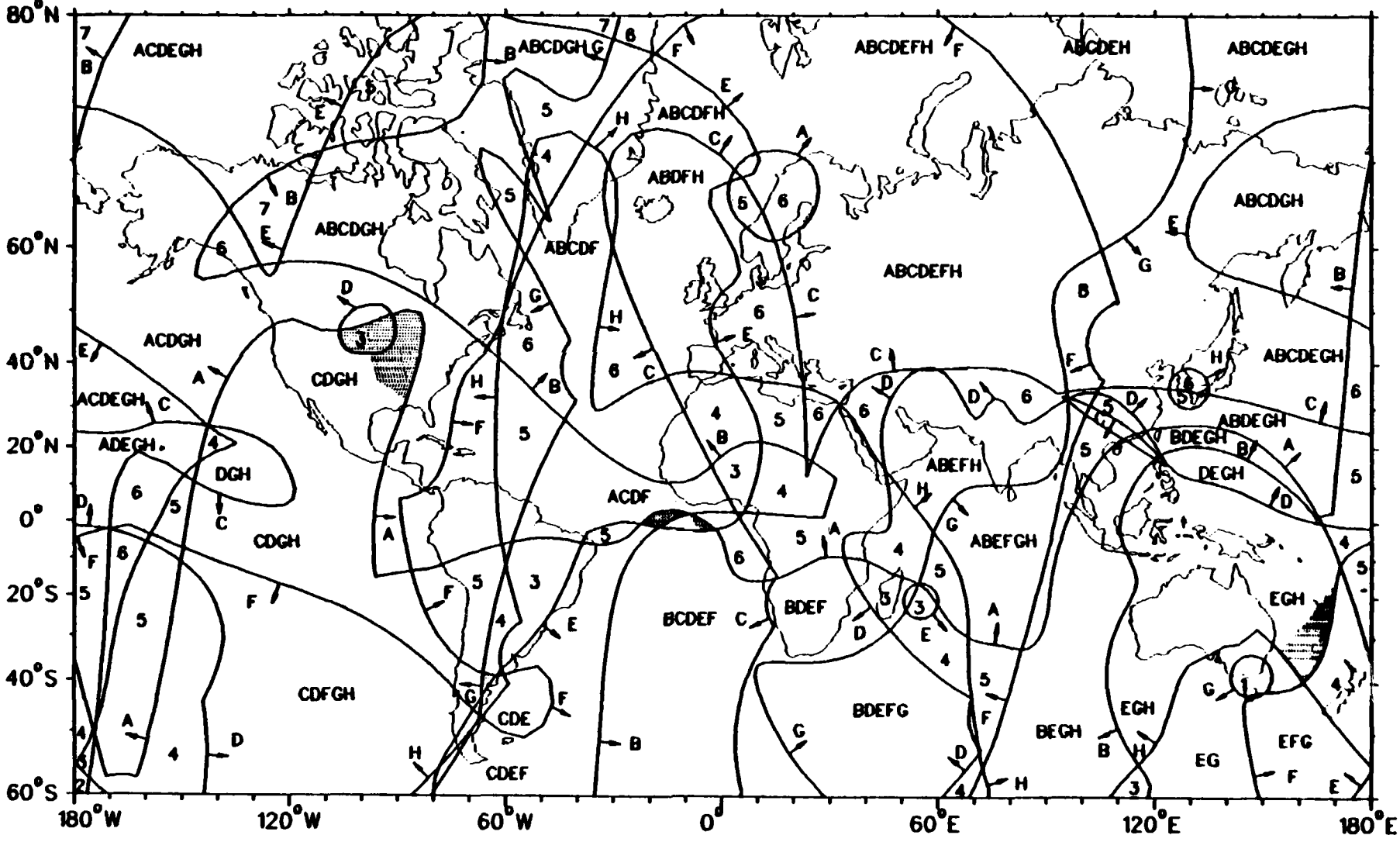

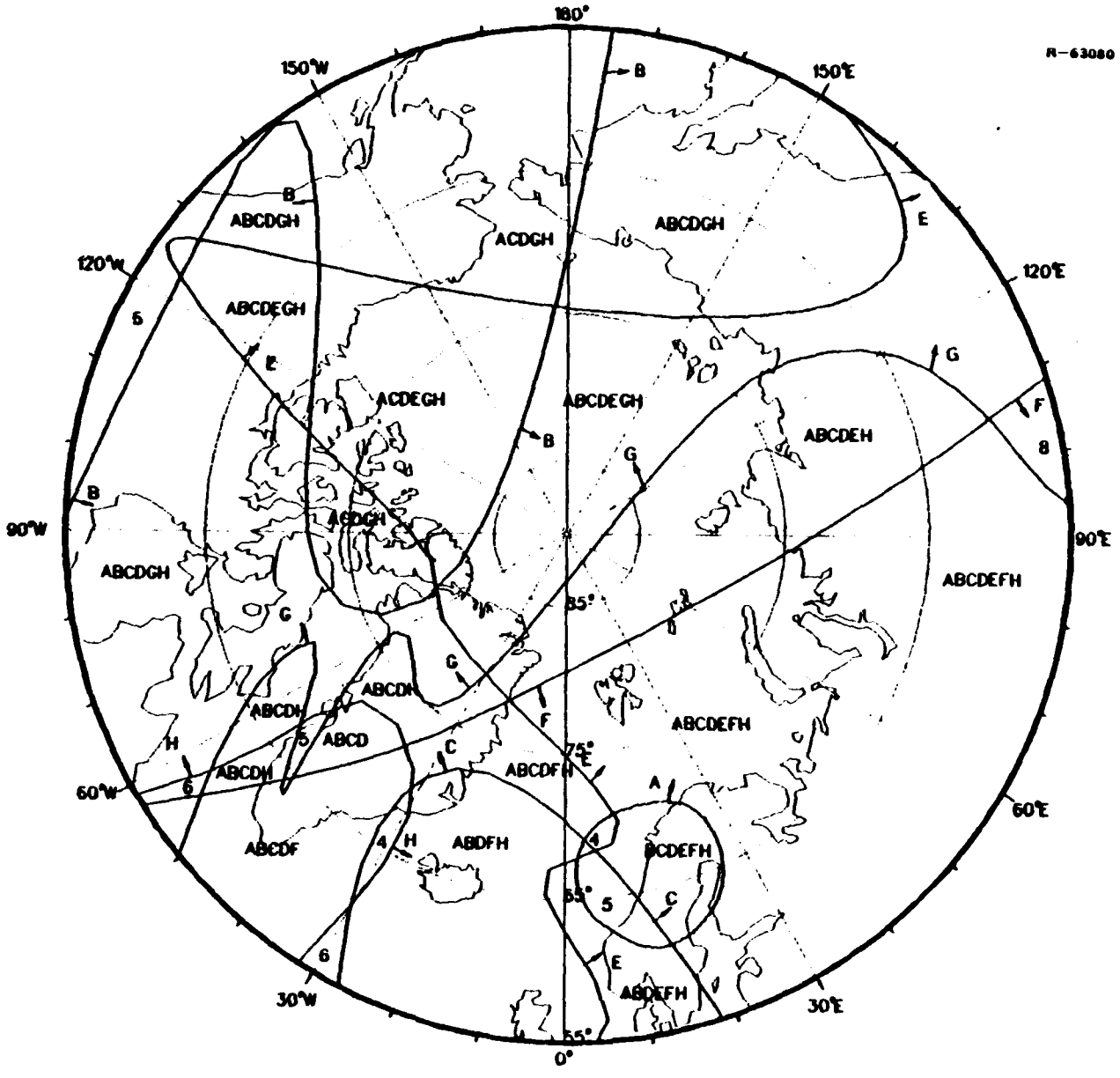

AZ EQ DIST
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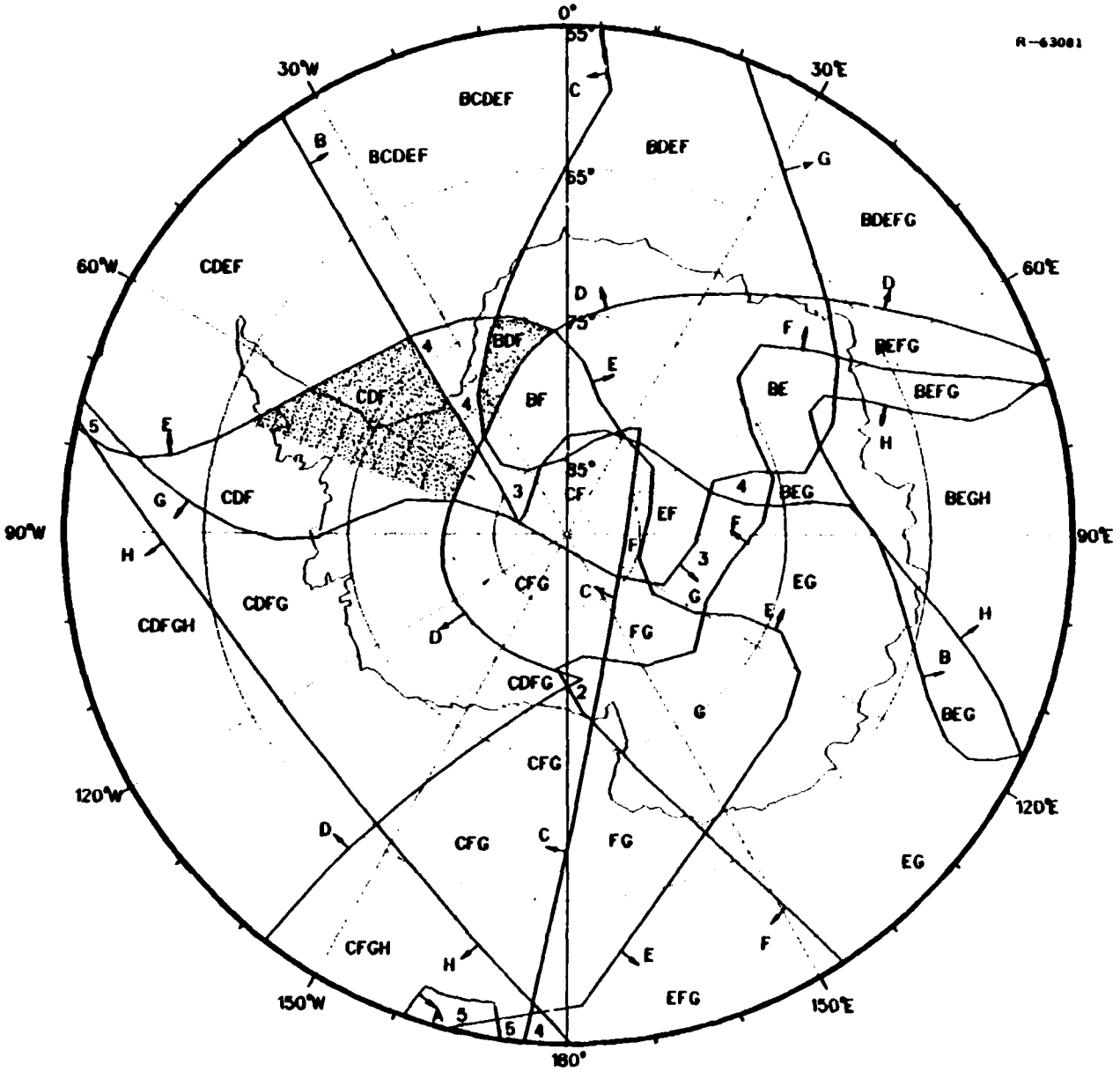
-20 dB SNR

FEBRUARY

0600 GMT



AZ EQ DIST
(S POLE)

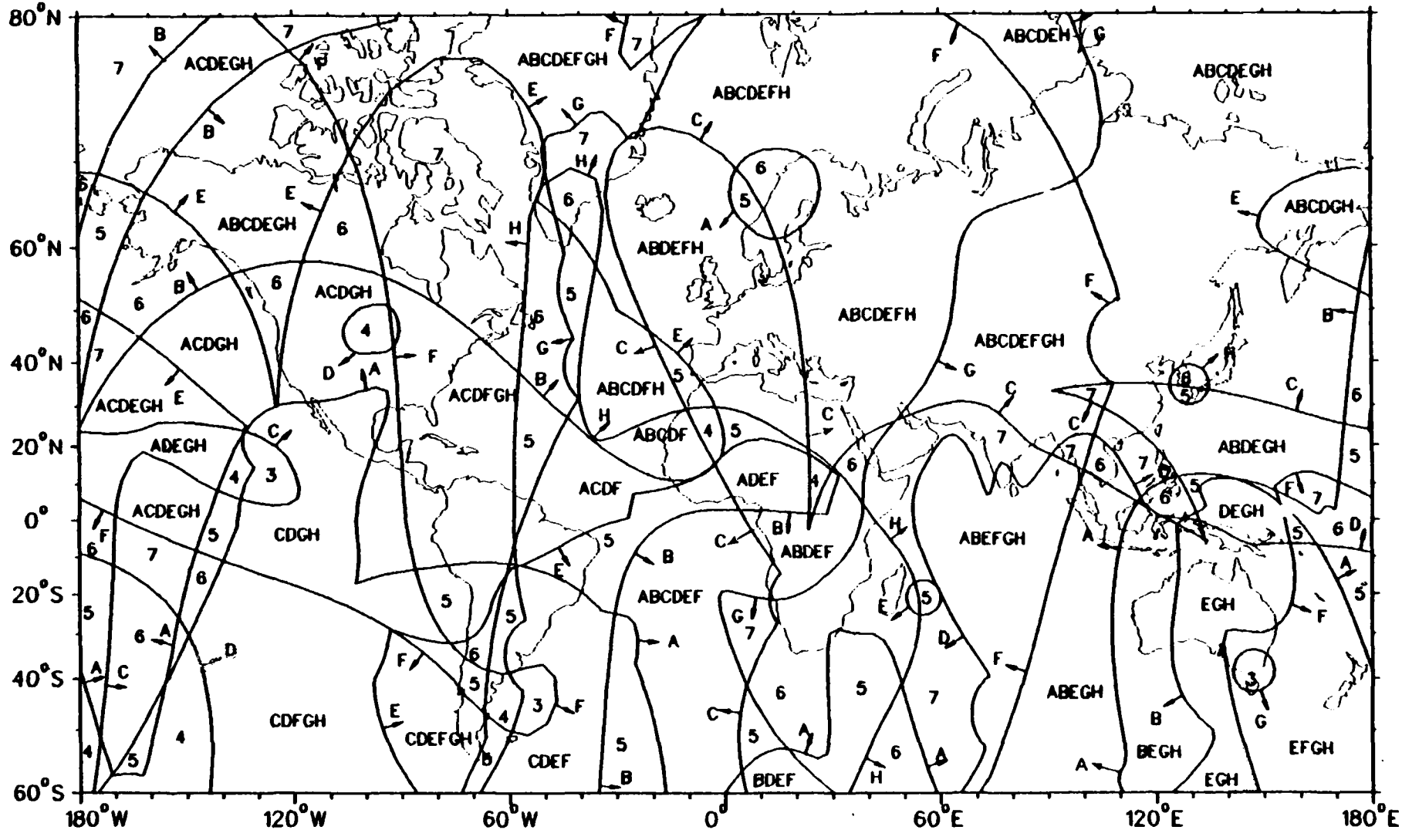
-20 dB SNR

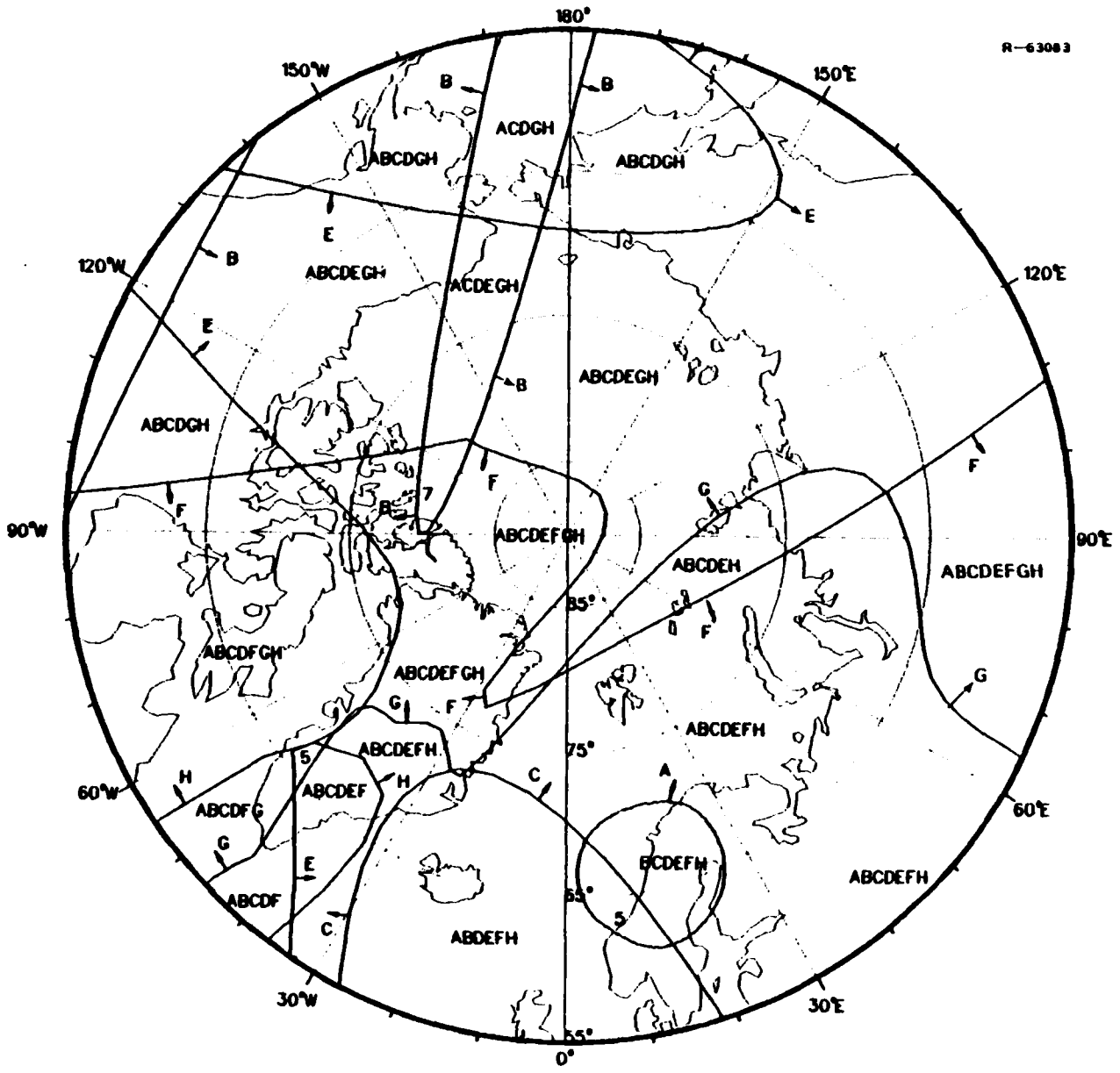
FEBRUARY

0600 GMT

-30 dB SNR FEBRUARY 0600 GMT

R-63082





AZ EQ DIST
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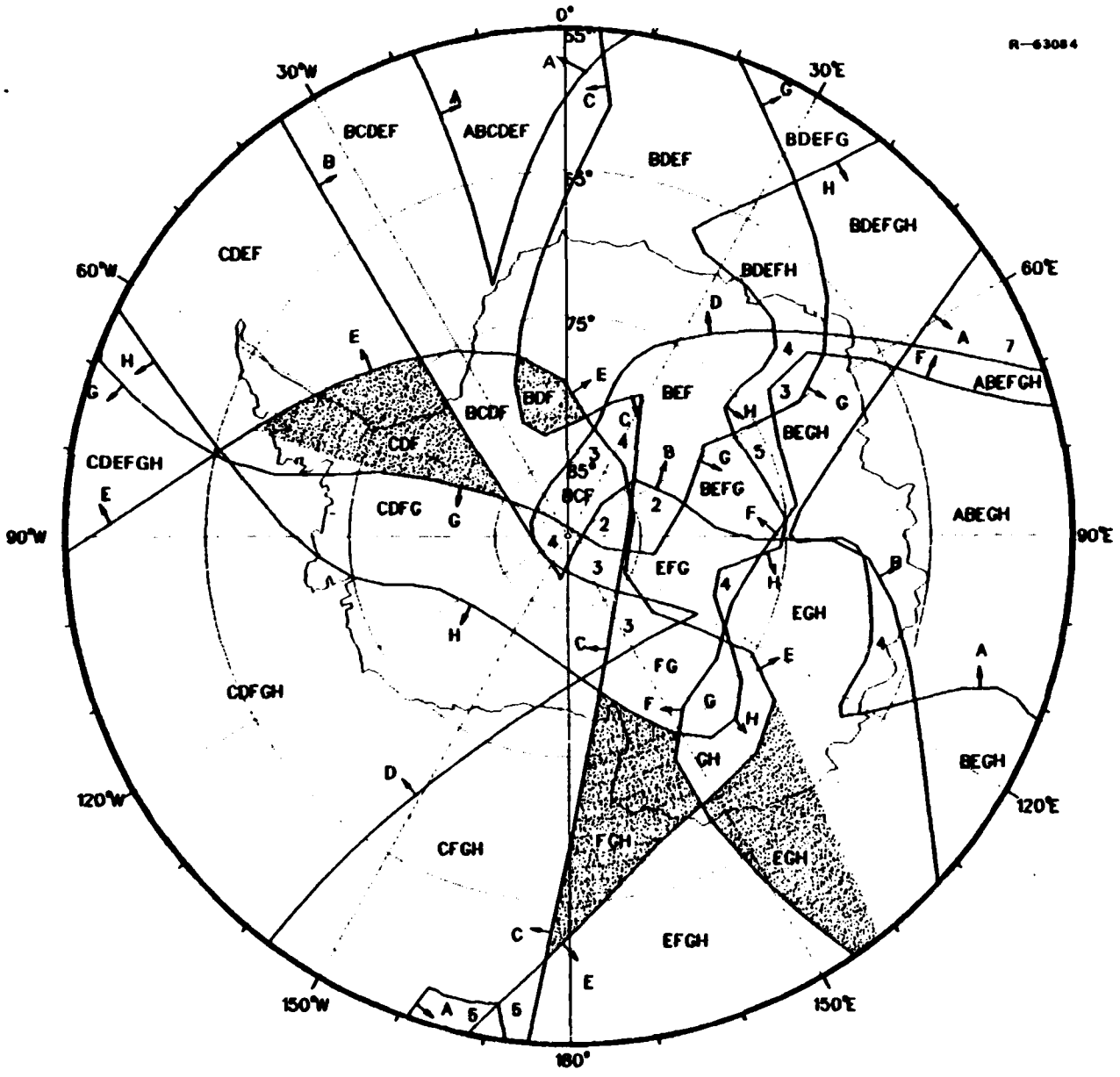
-30 dB SNR

FEBRUARY

0600 GMT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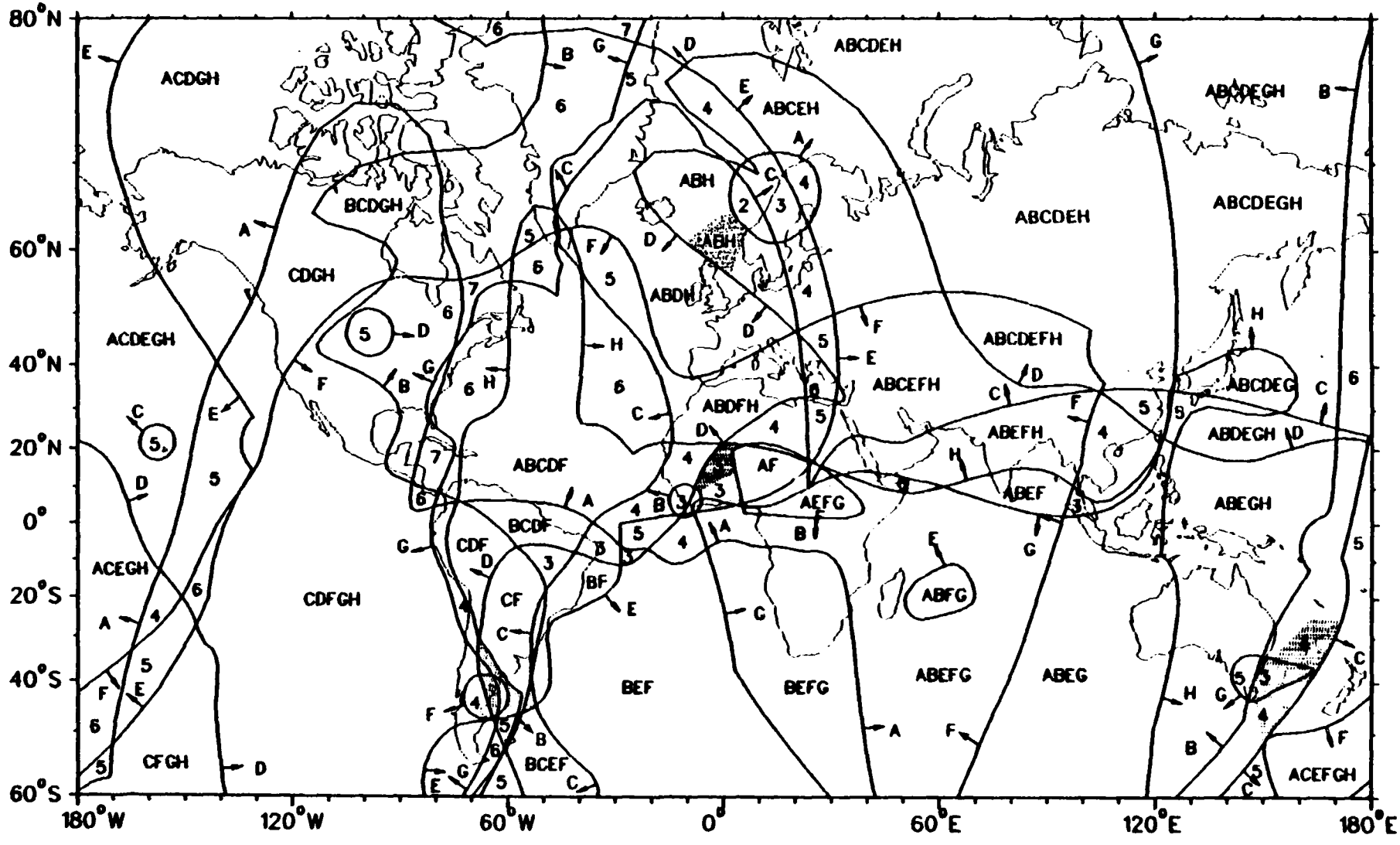
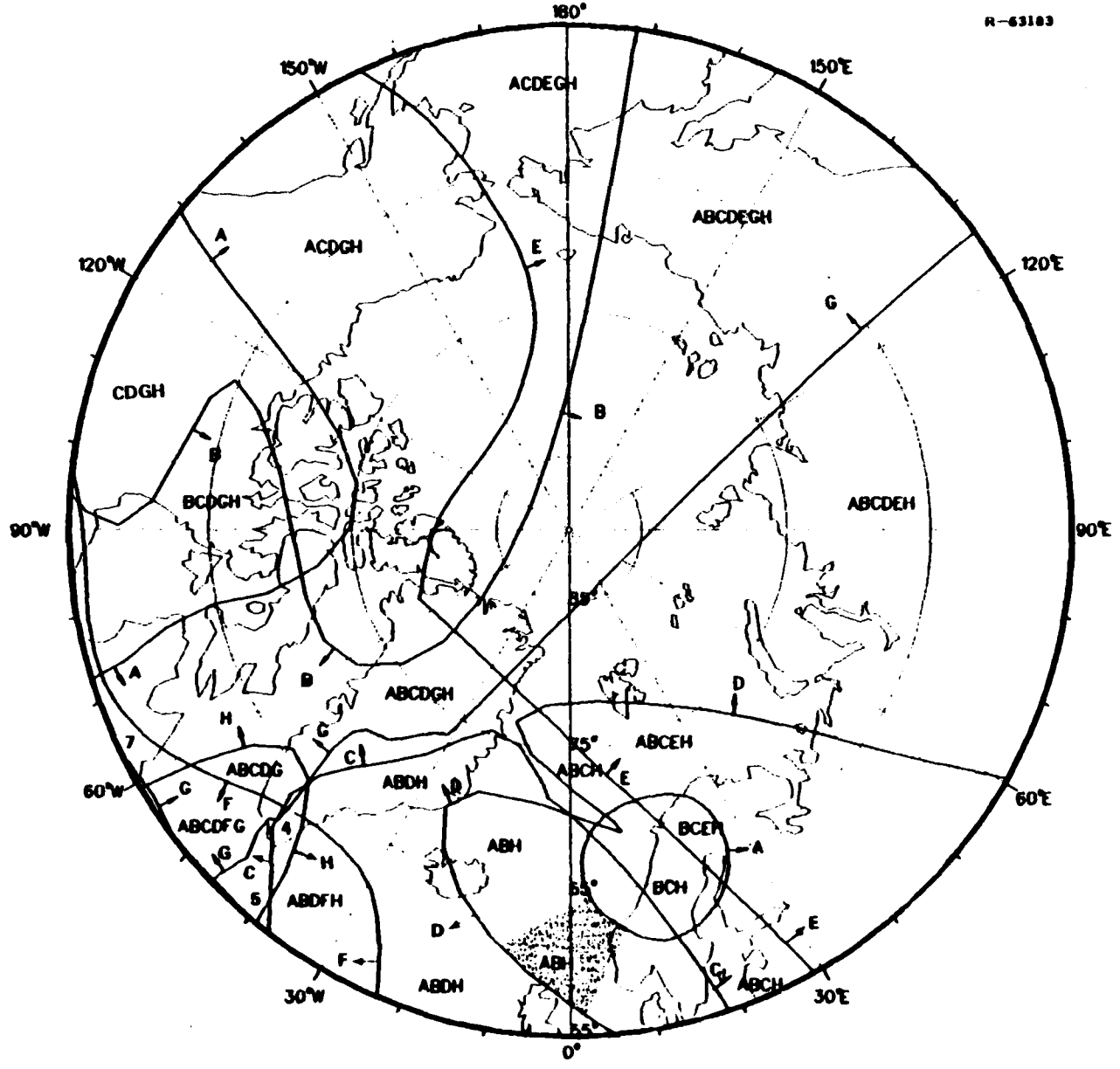
30°E
60°W
60°E
90°W
90°E
120°W
120°E
150°W
150°E
180°
55°
65°
75°
85°
BCDEF
ABCDEF
BDEF
BDEFG
BDEFGH
CDEF
BDEFH
CDEFGH
BCDF
BDF
BEF
ABEFGH
CDF
BEGH
BCF
BEFG
ABEGH
CDFG
EFG
EGH
FG
CDFGH
GH
BEGH
CFGH
FGH
EGH
EFGH
AZ EQ DIST
(S POLE)
-30 dB SNR
FEBRUARY
0600 GMT

-20 dB SNR FEBRUARY 1800 GMT

R-63074





AZ EQ DIST
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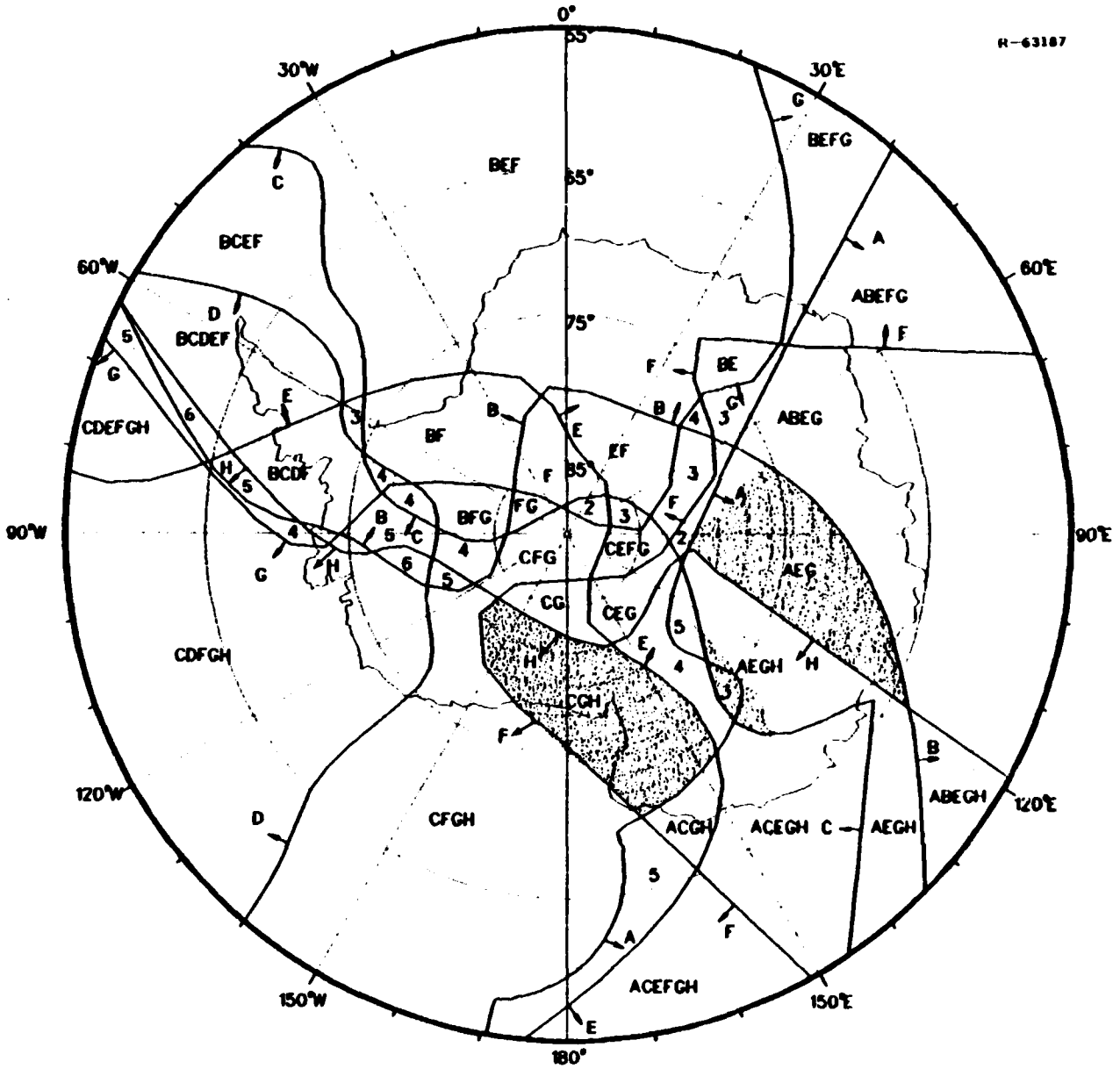
-20 dB SNR

FEBRUARY

1800 GMT



AZ EQ DIST
(S POLE)

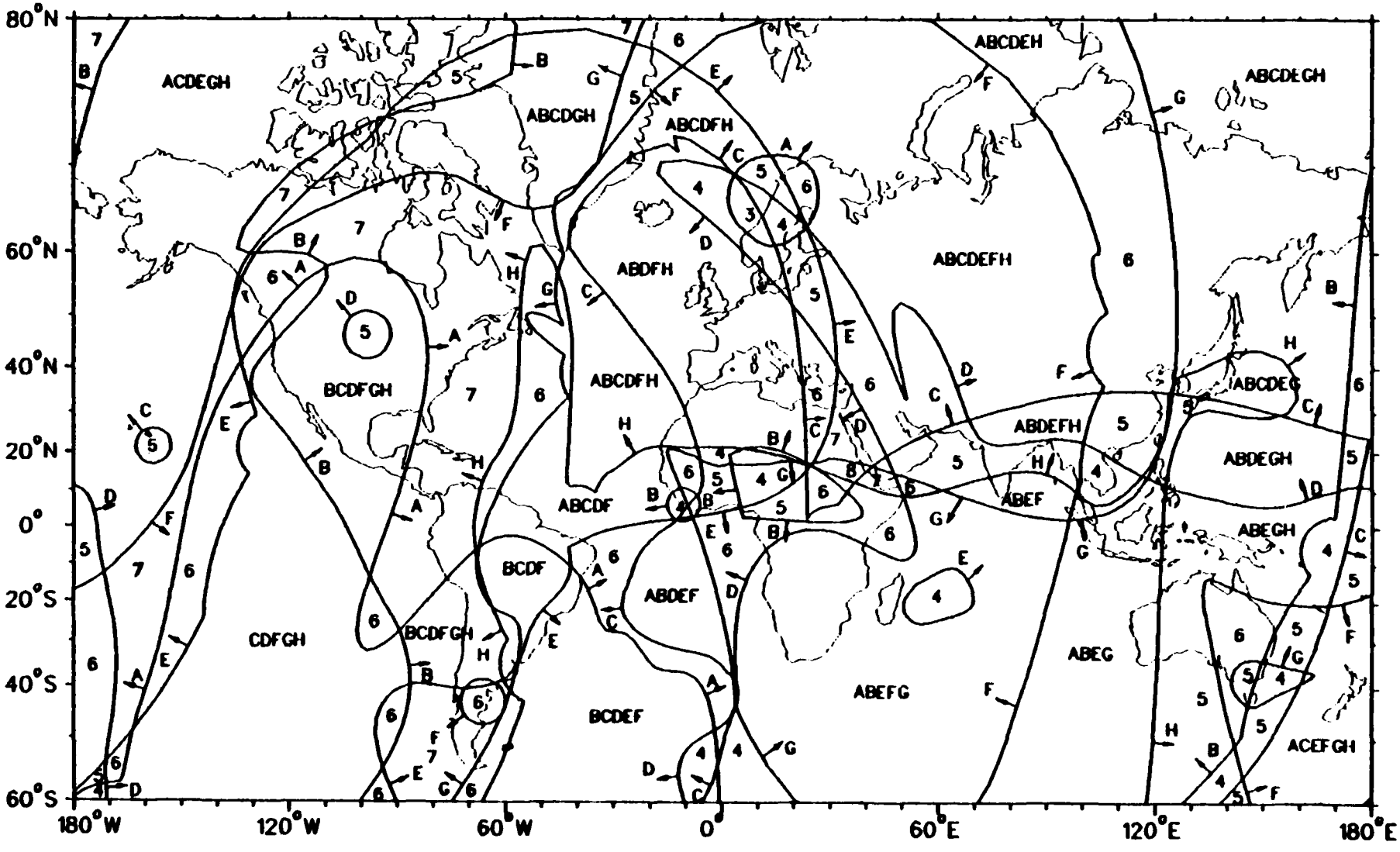
-20 dB SNR

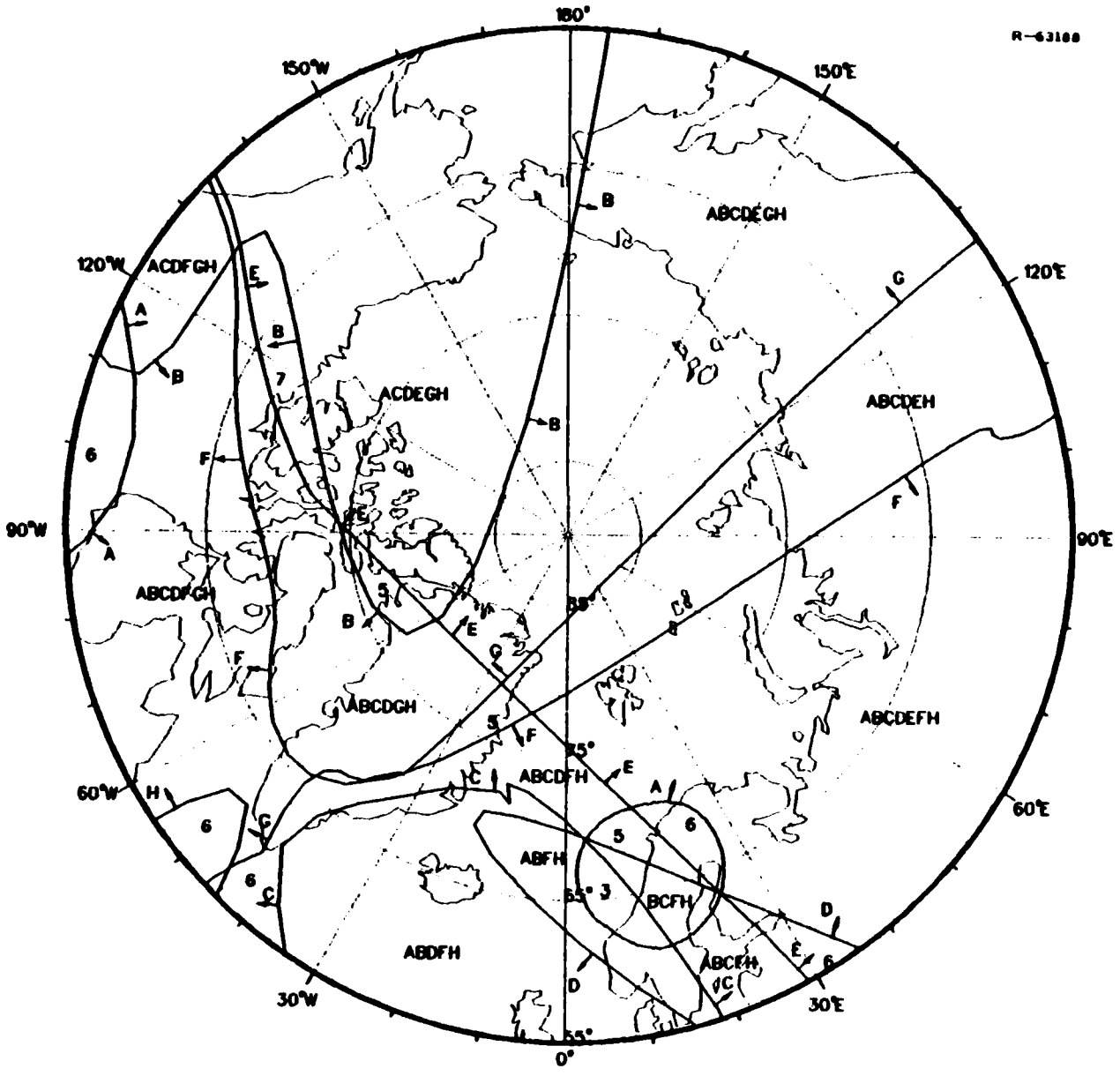
FEBRUARY

1800 GMT

-30 dB SNR	FEBRUARY	1800 GMT

R-63075





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-30 dB SNR

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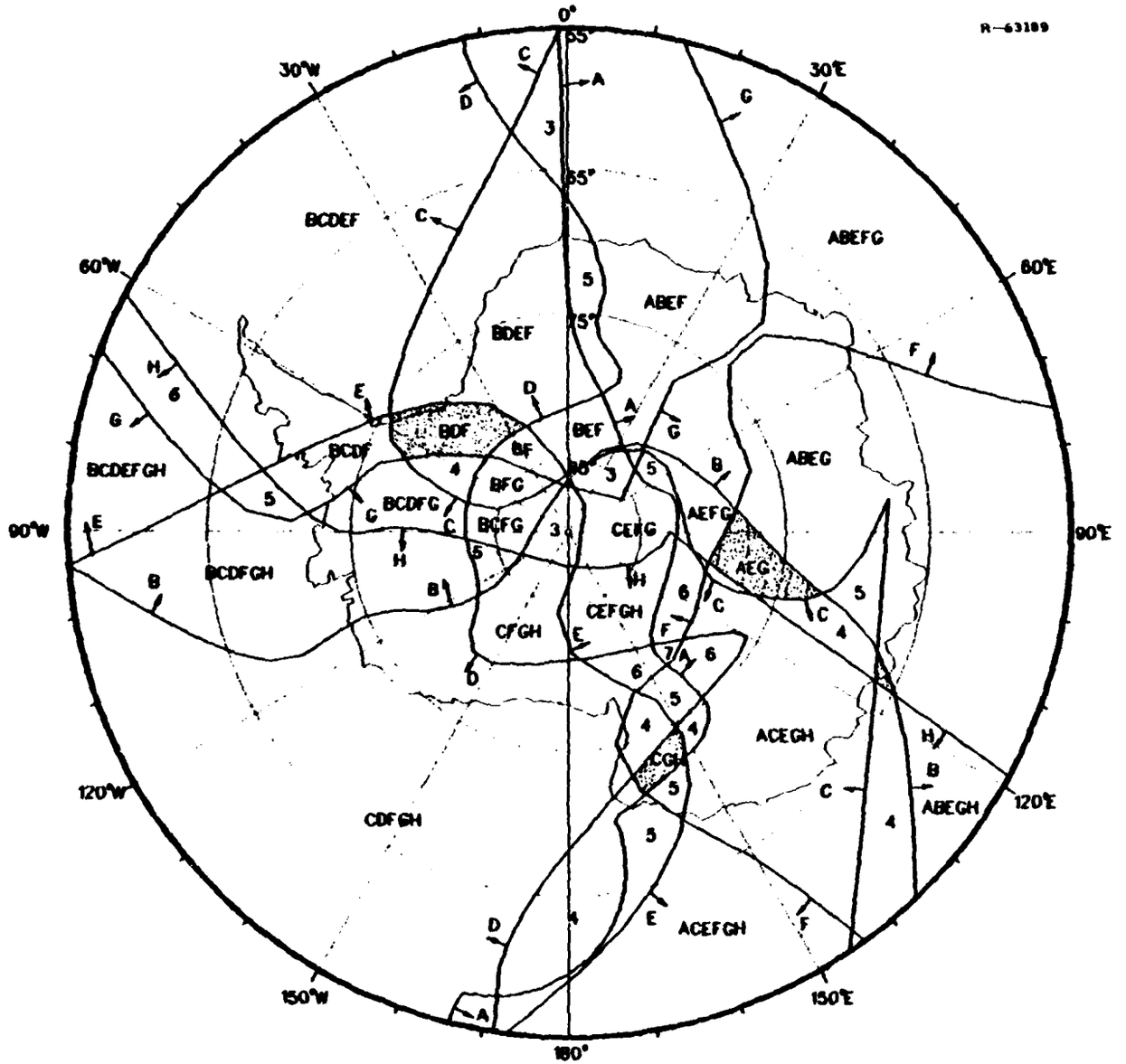

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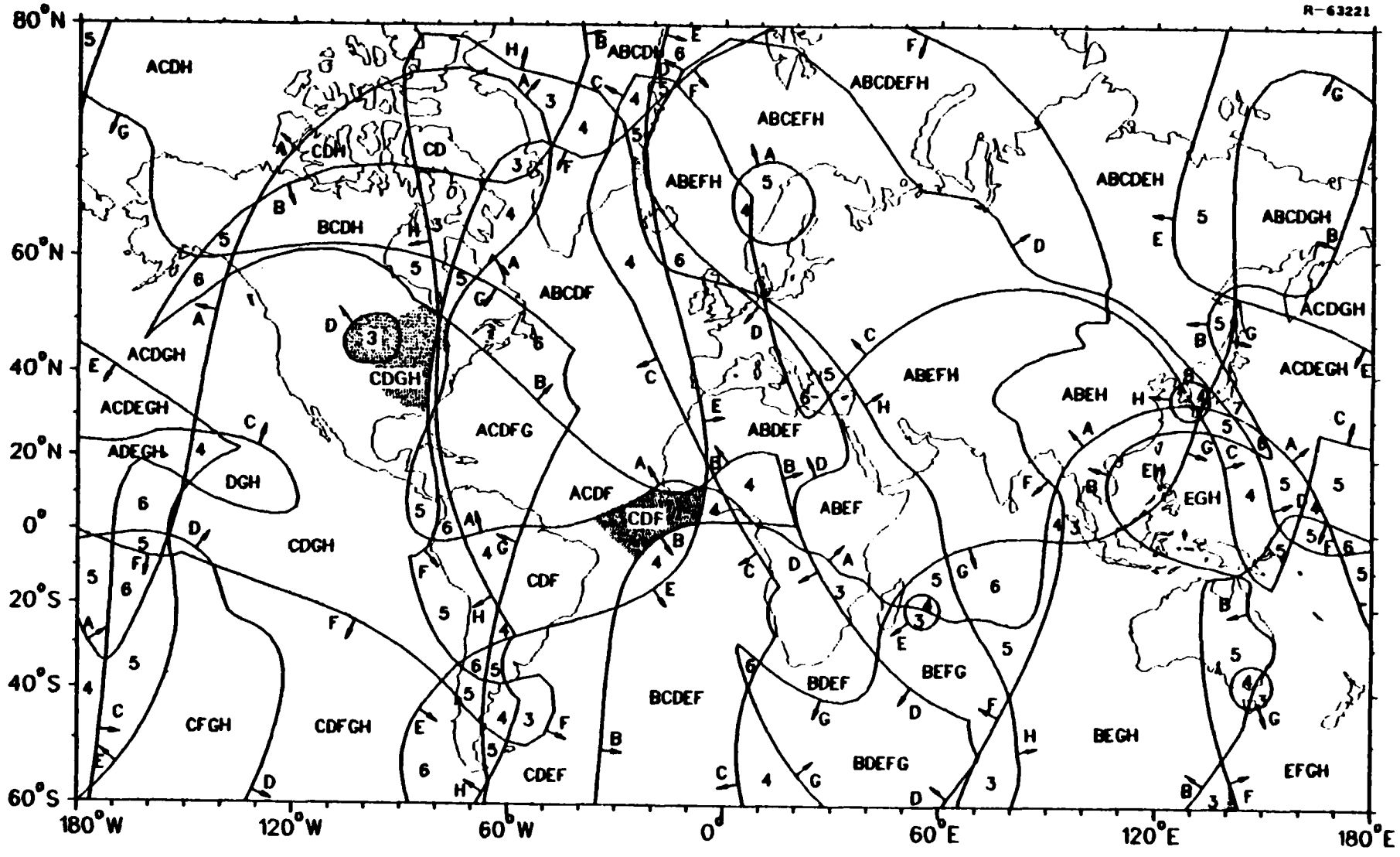
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MAY
0600 GMT
R-63221
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0°
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120°W
60°W
0
60°E
120°E
180°E
ACDH
CDH
CD
BCDH
ABCDH
ABCDEFH
ABCEFH
ABEFH
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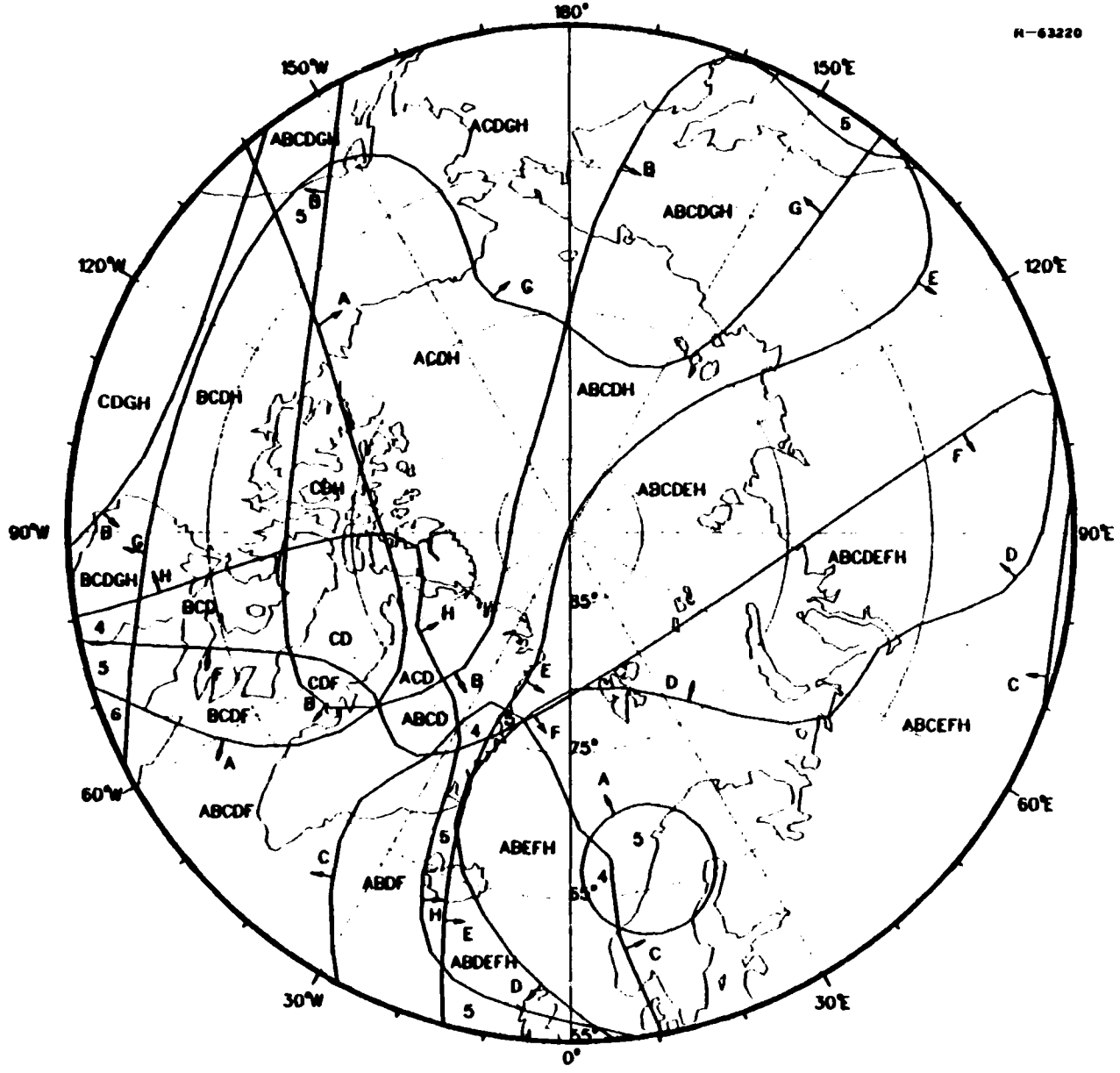

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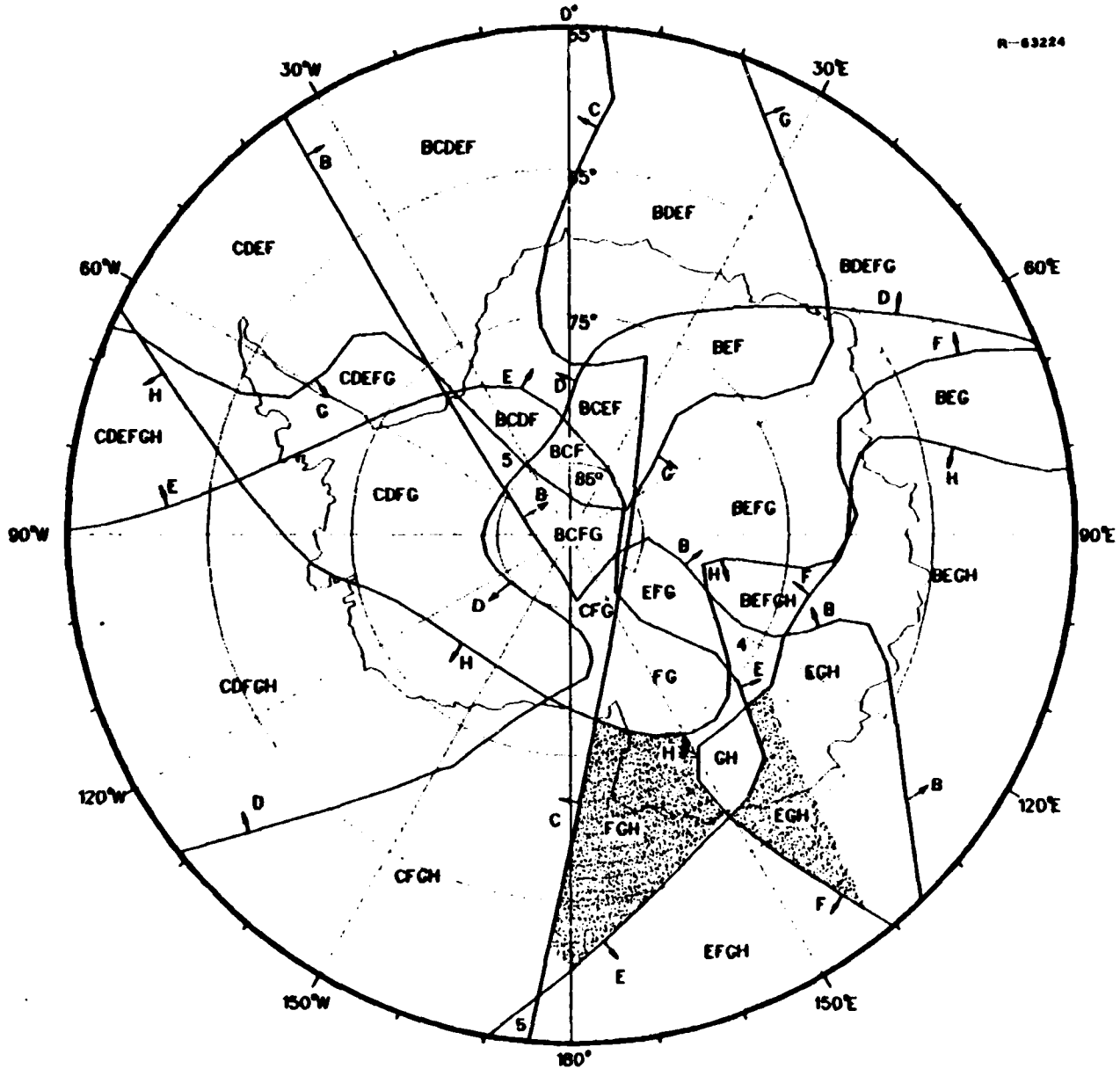

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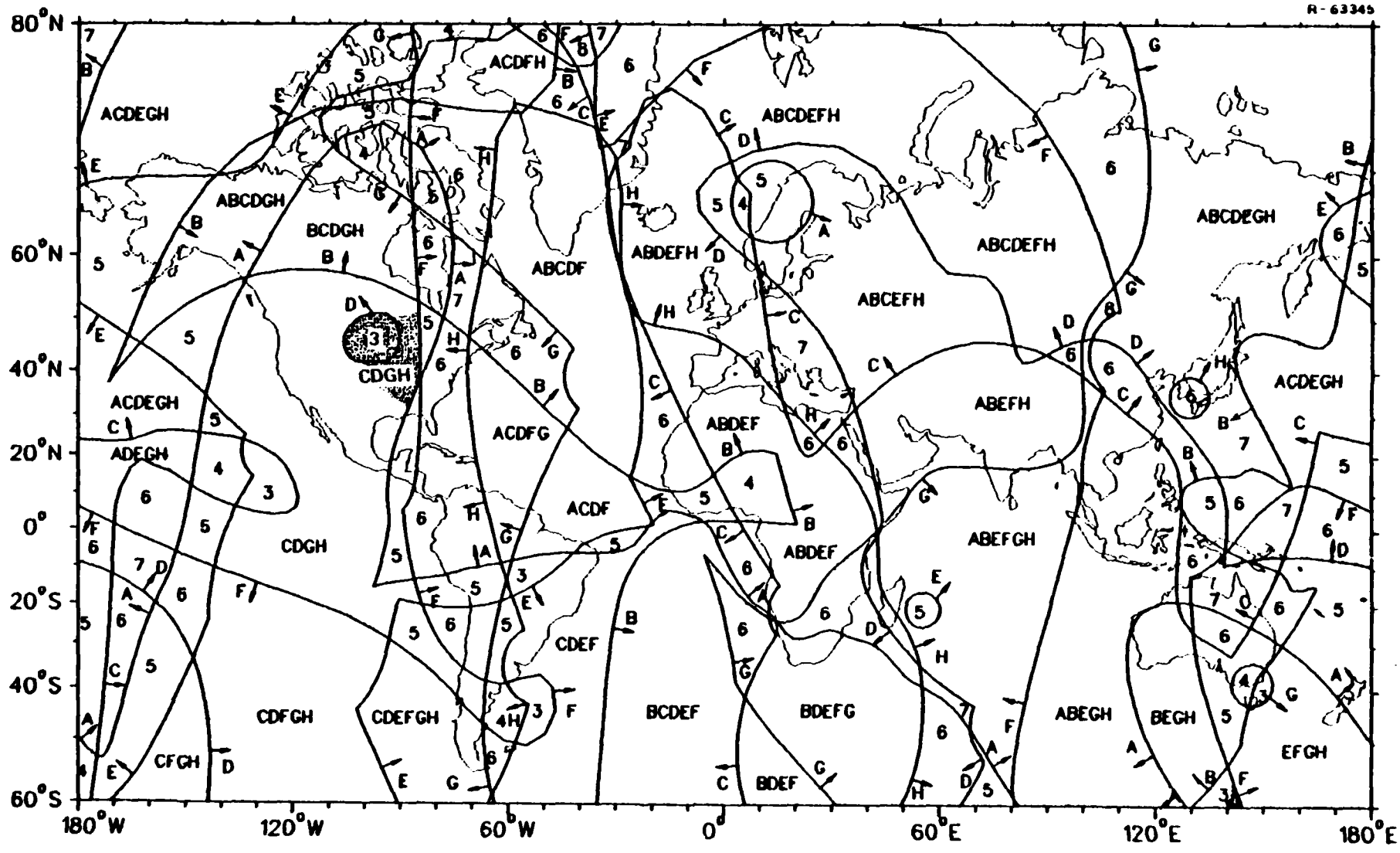
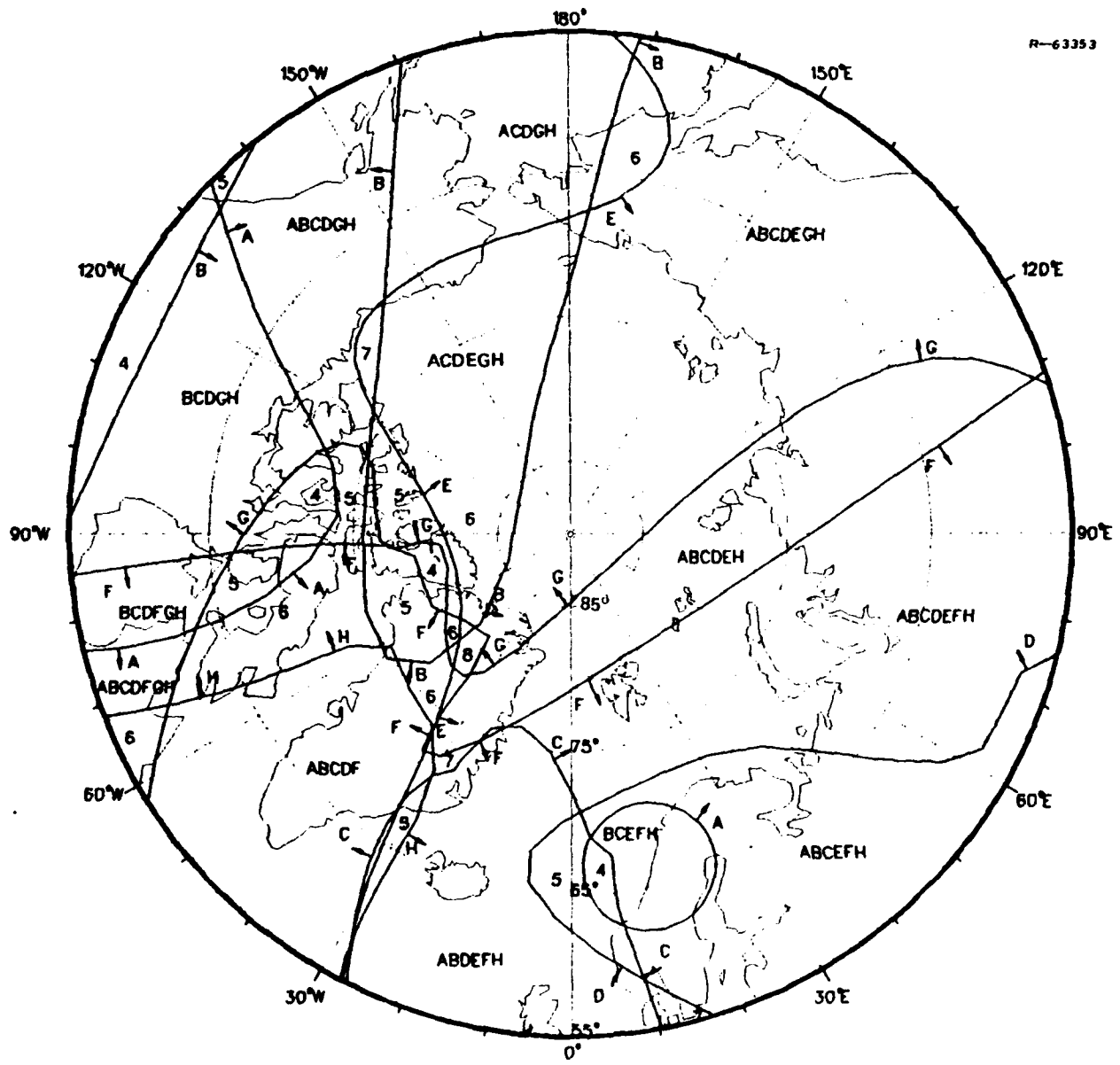
-30 dB SNR	MAY	0600 GMT





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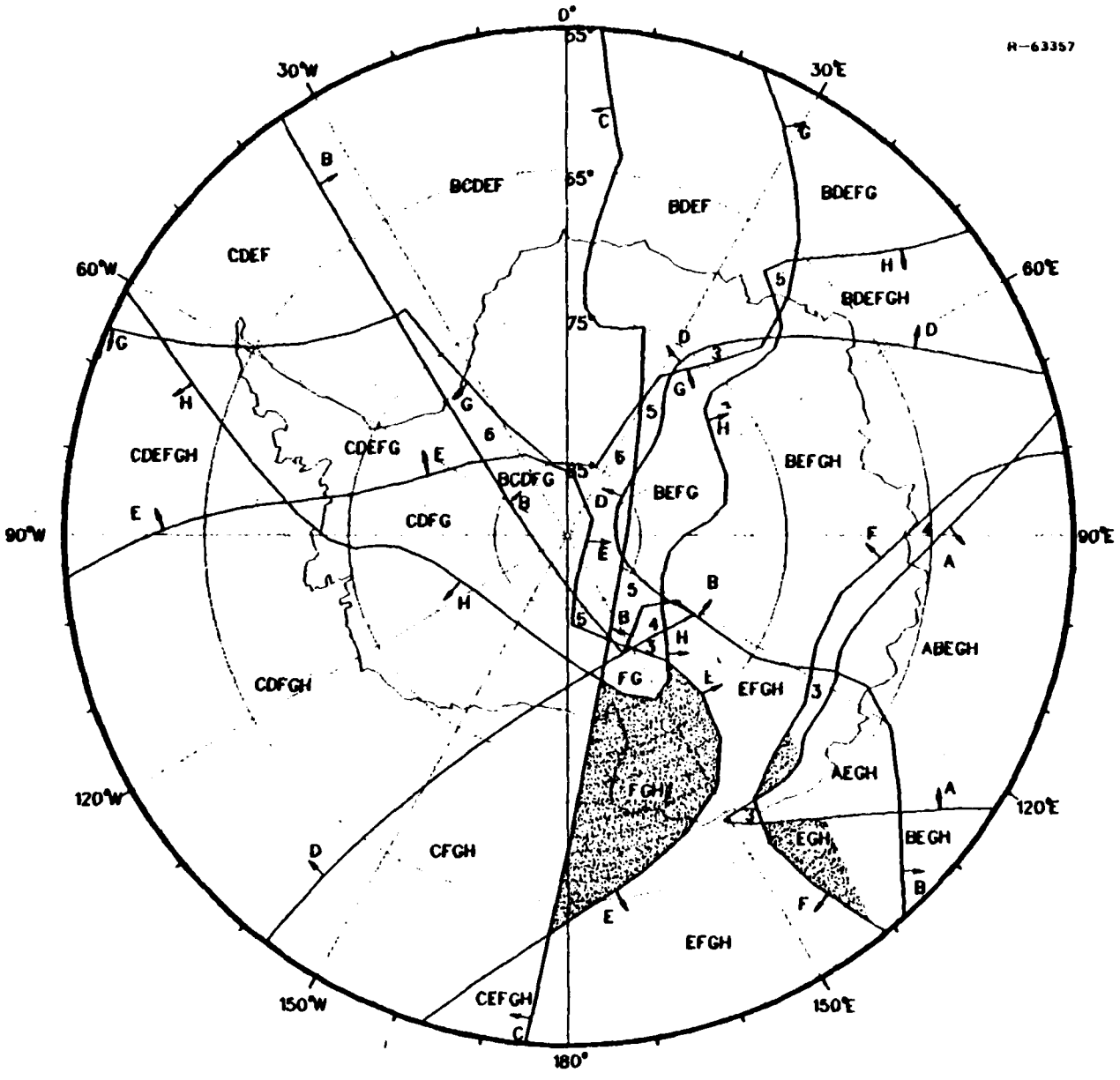

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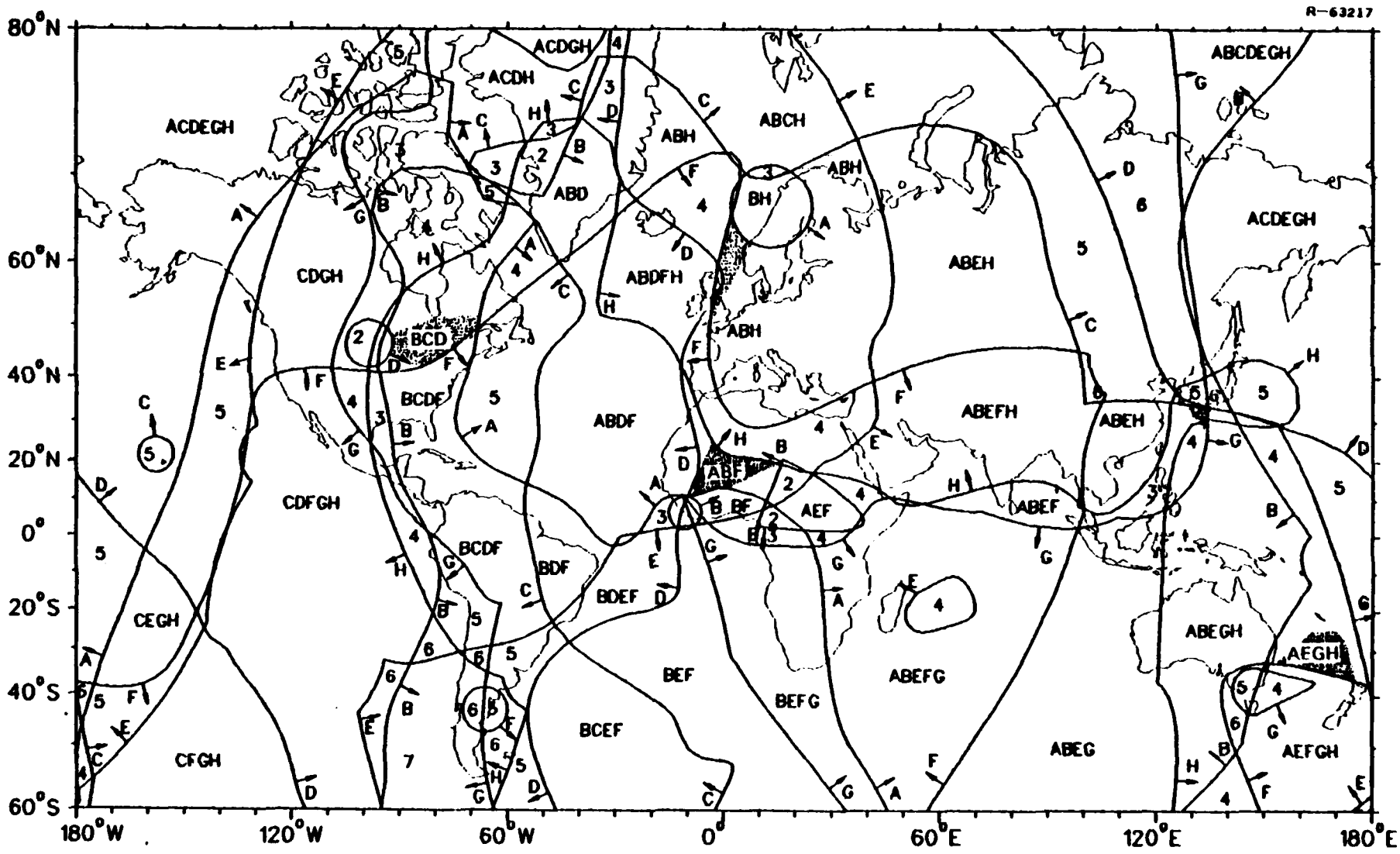

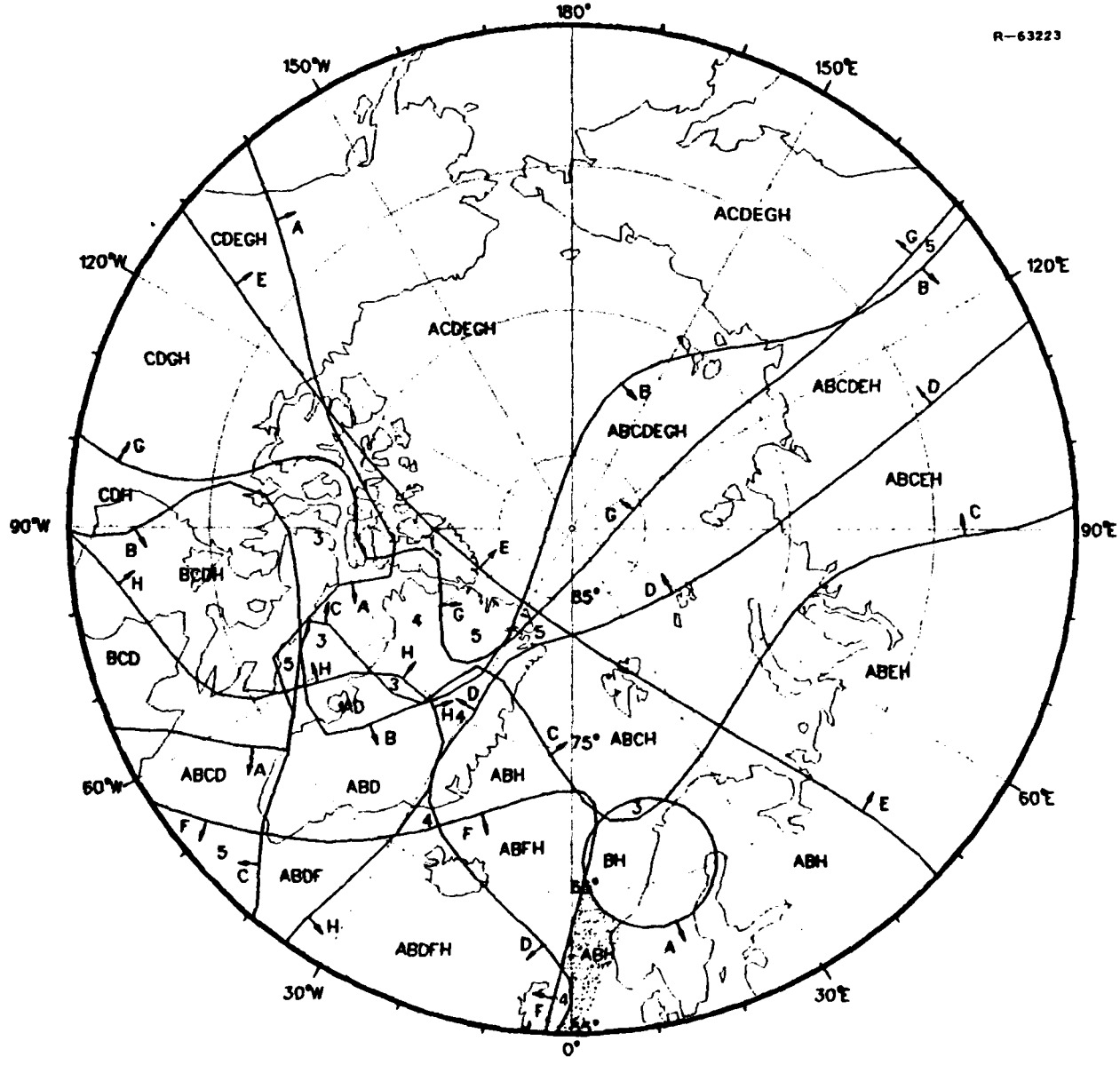

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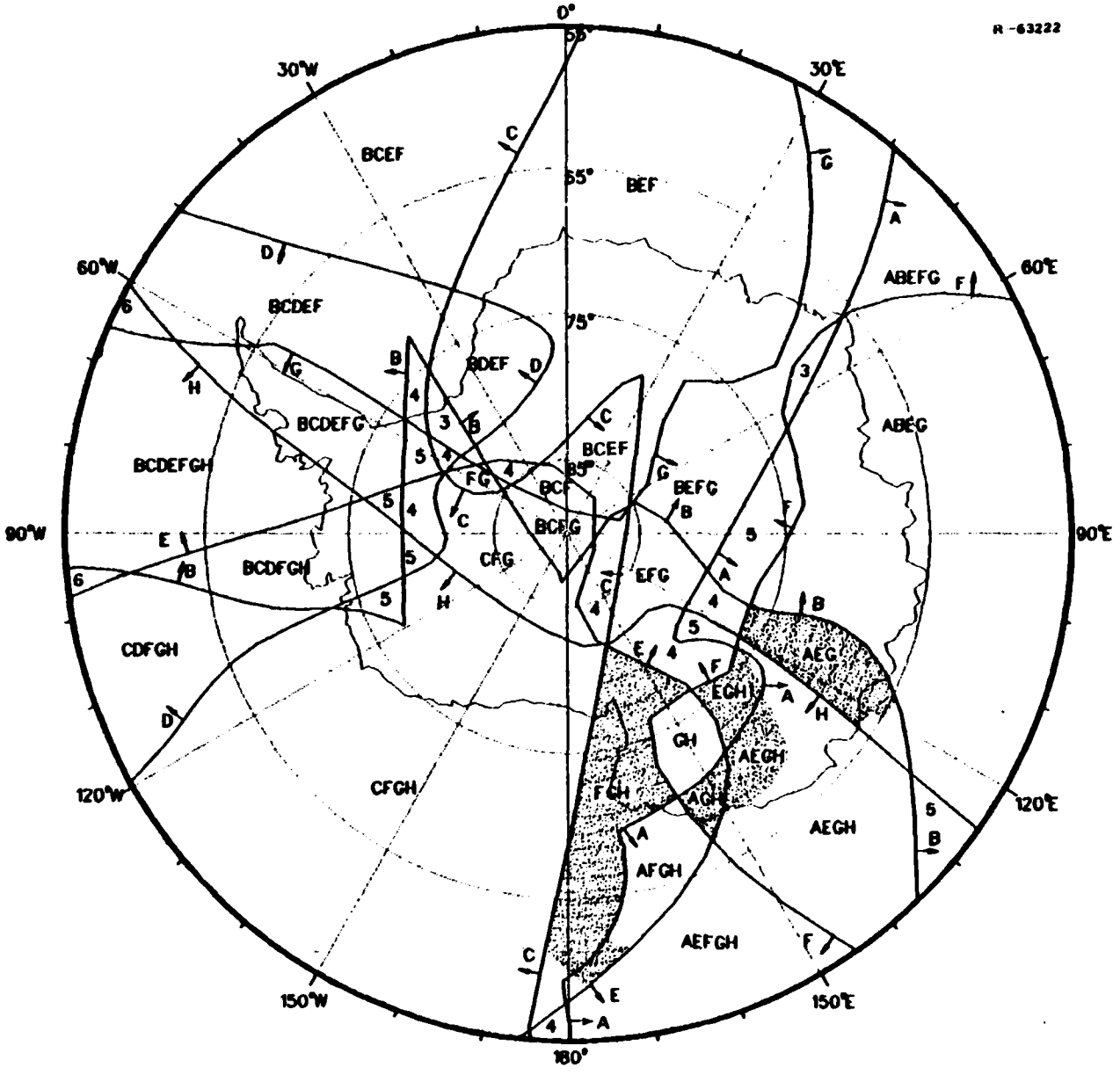

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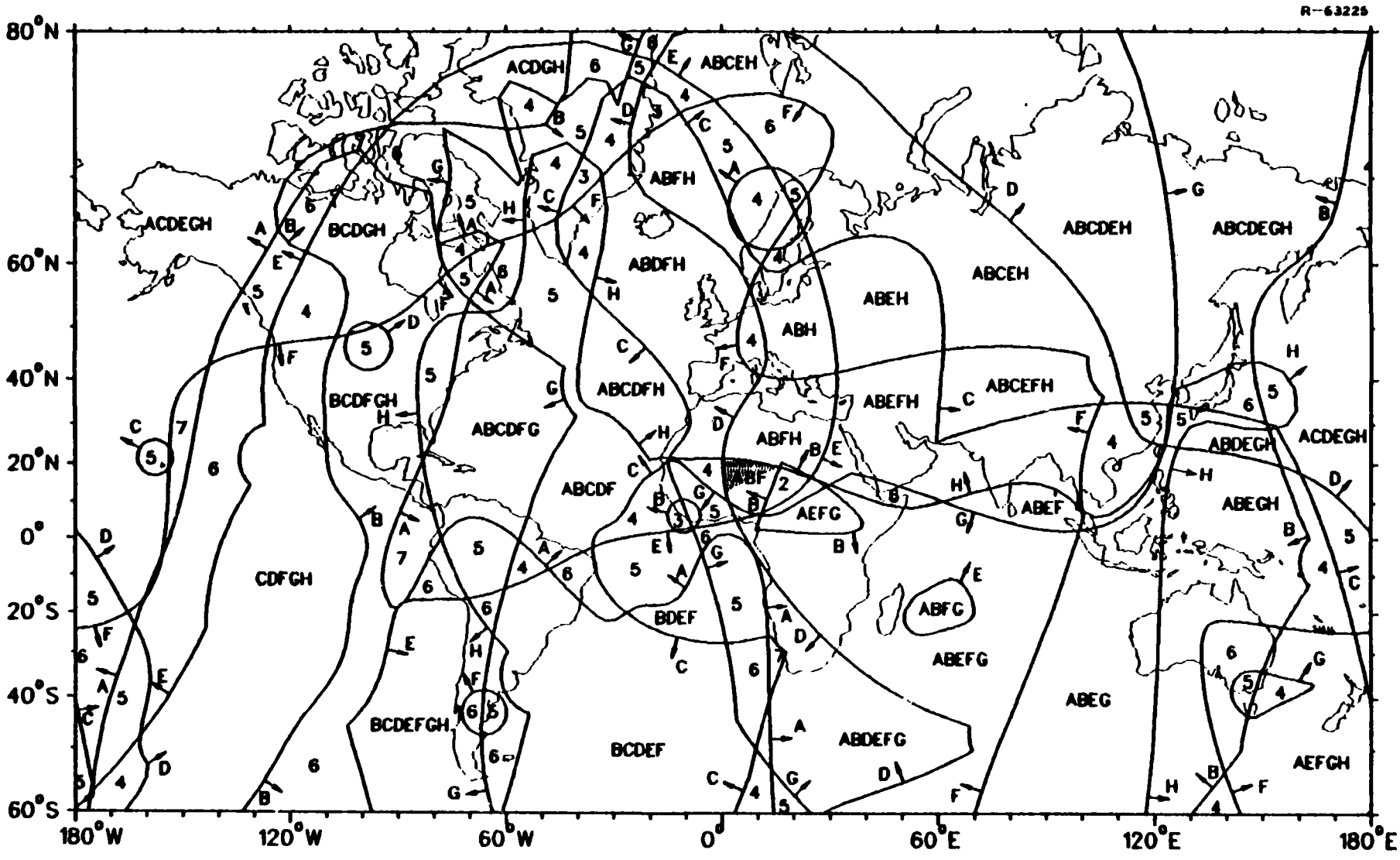
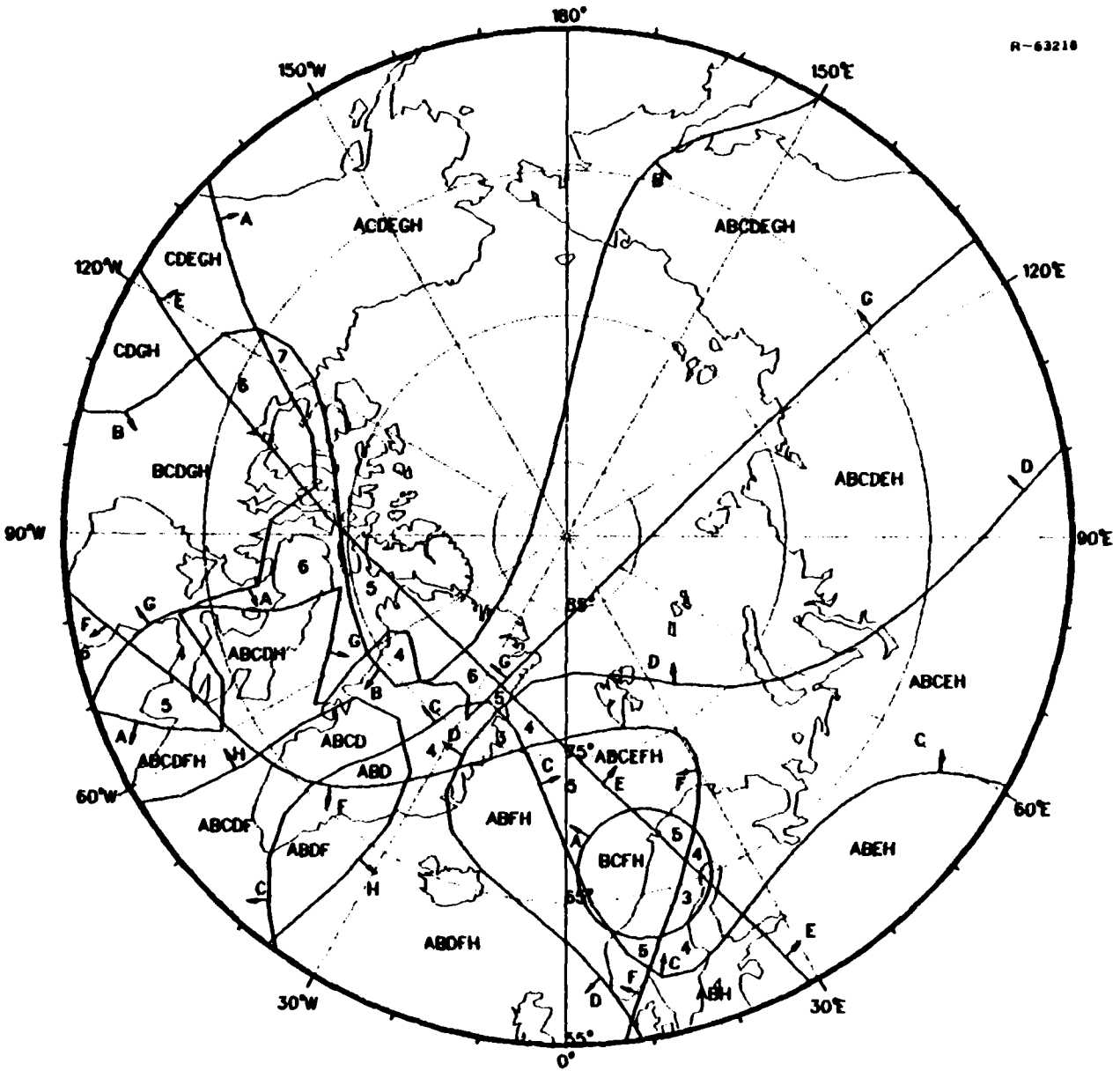
-30 dB SNR	MAY	1800 GMT





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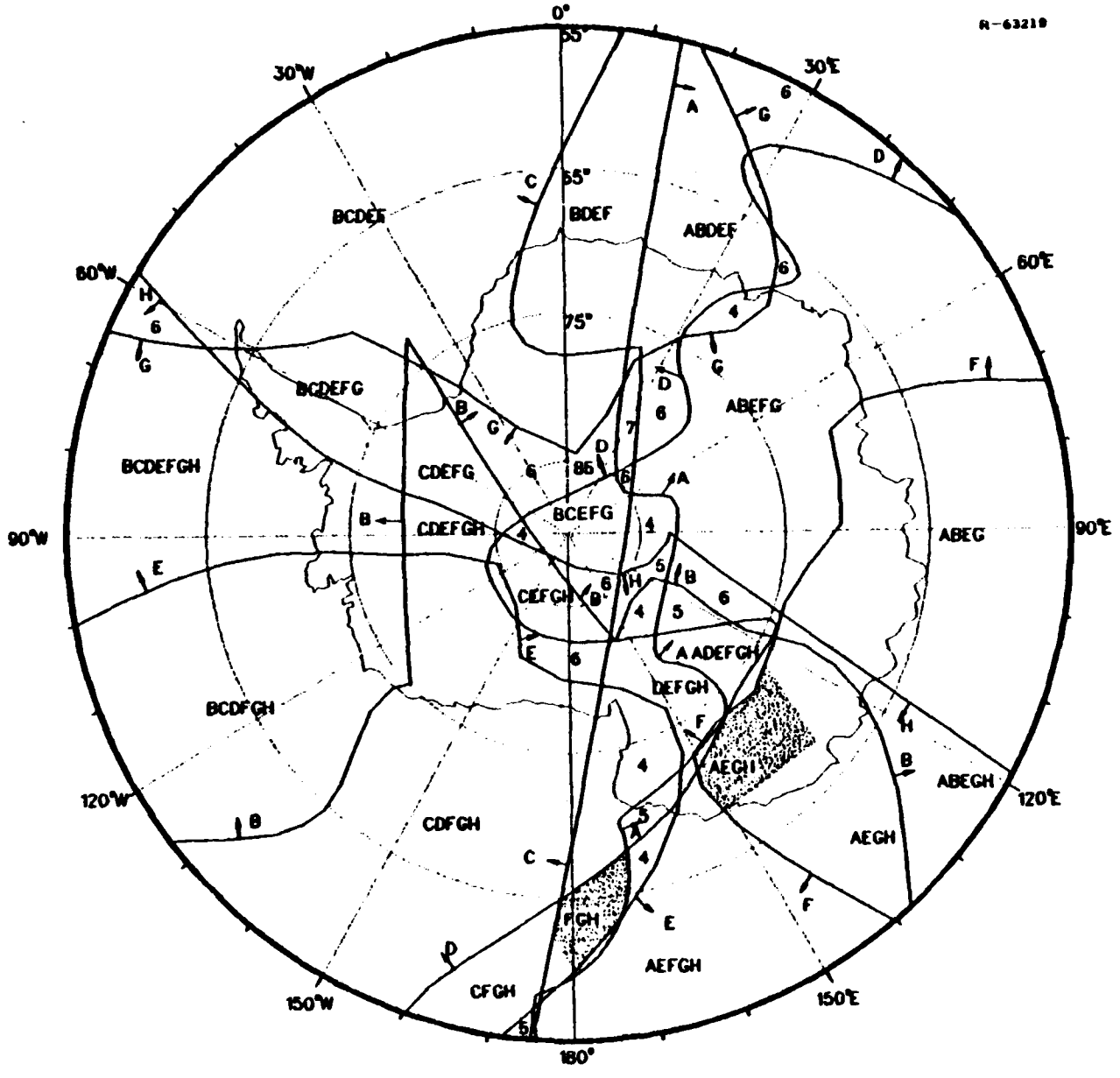

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-20 dB SNR	AUGUST	0600 GMT

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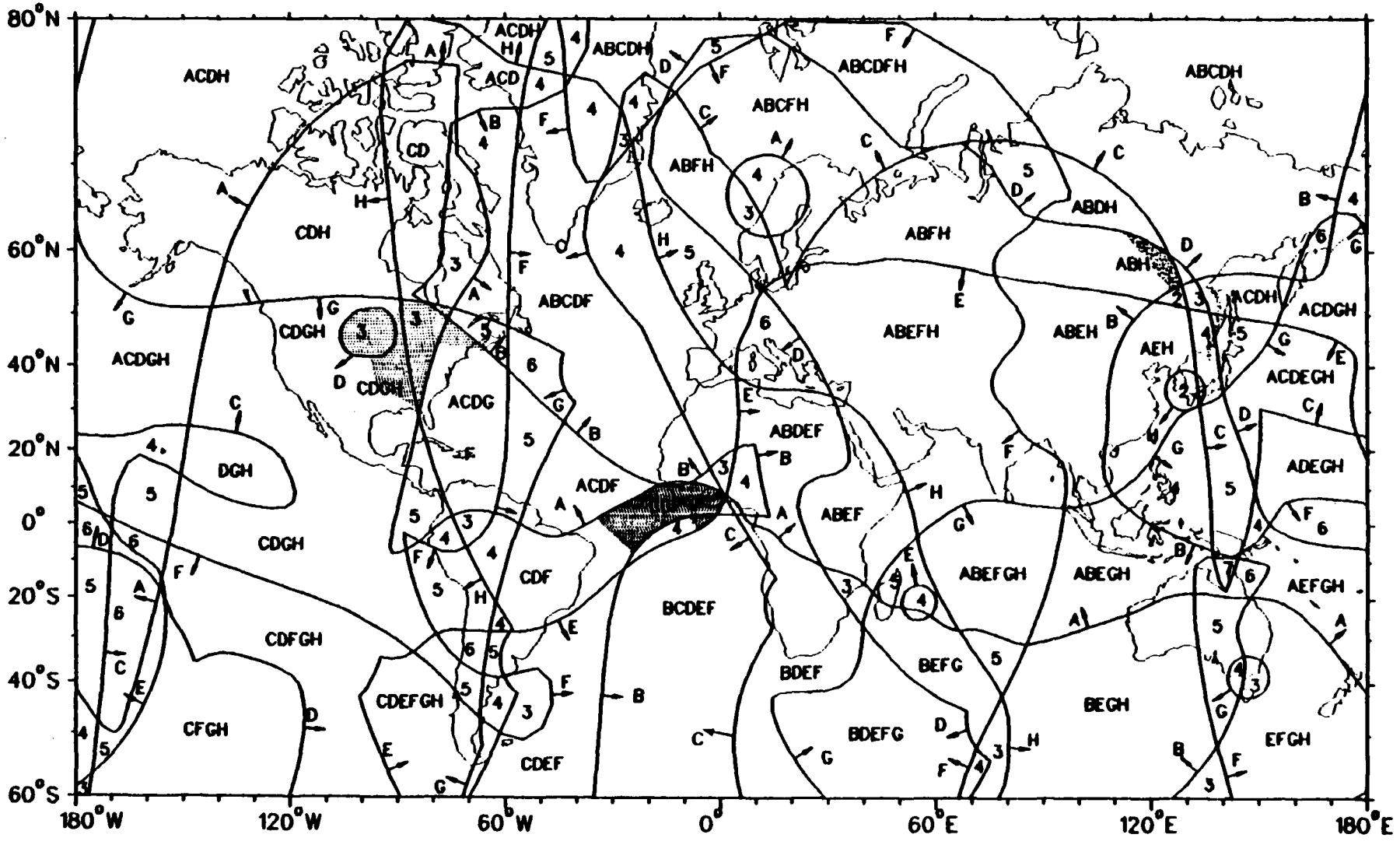

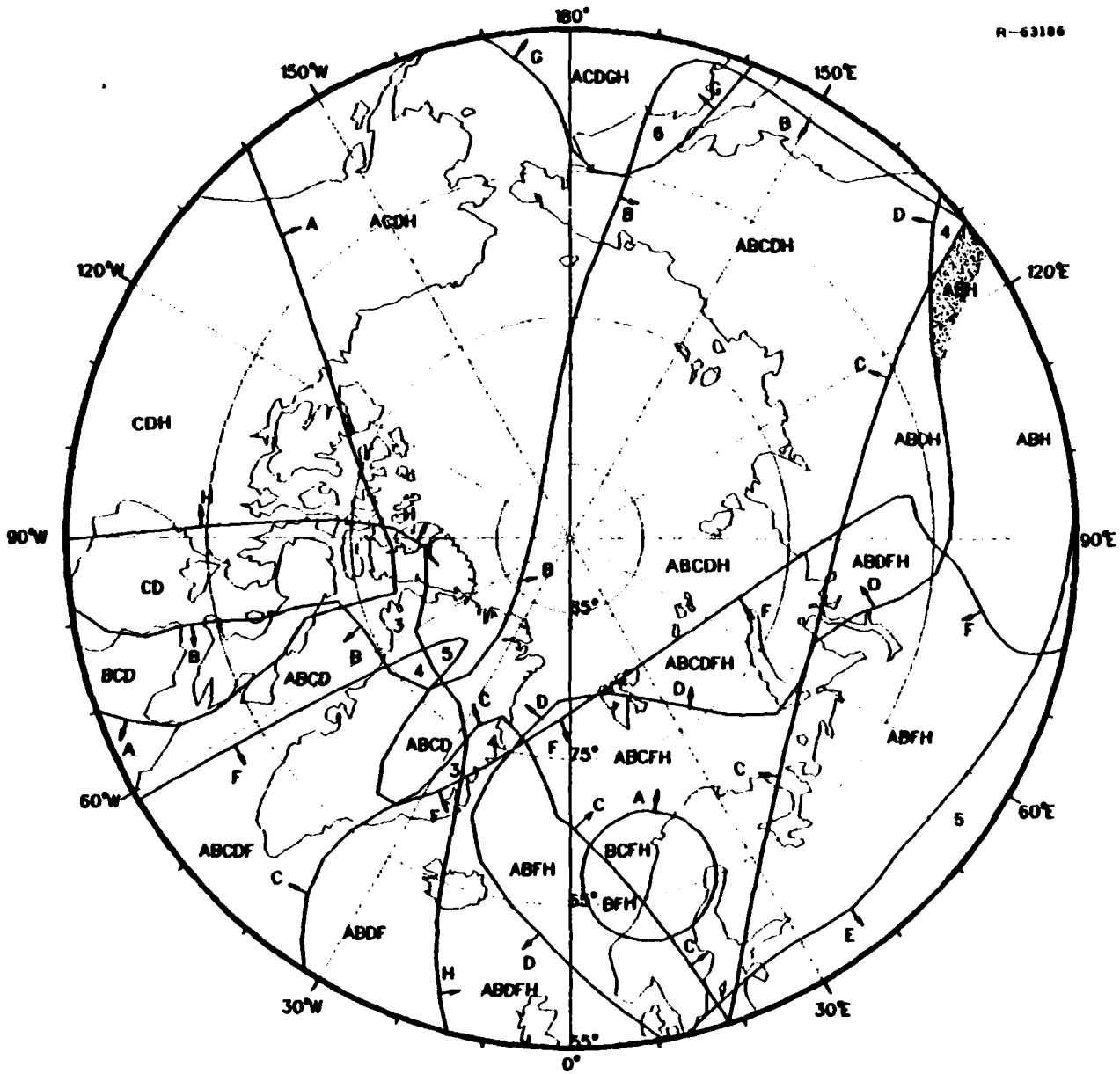

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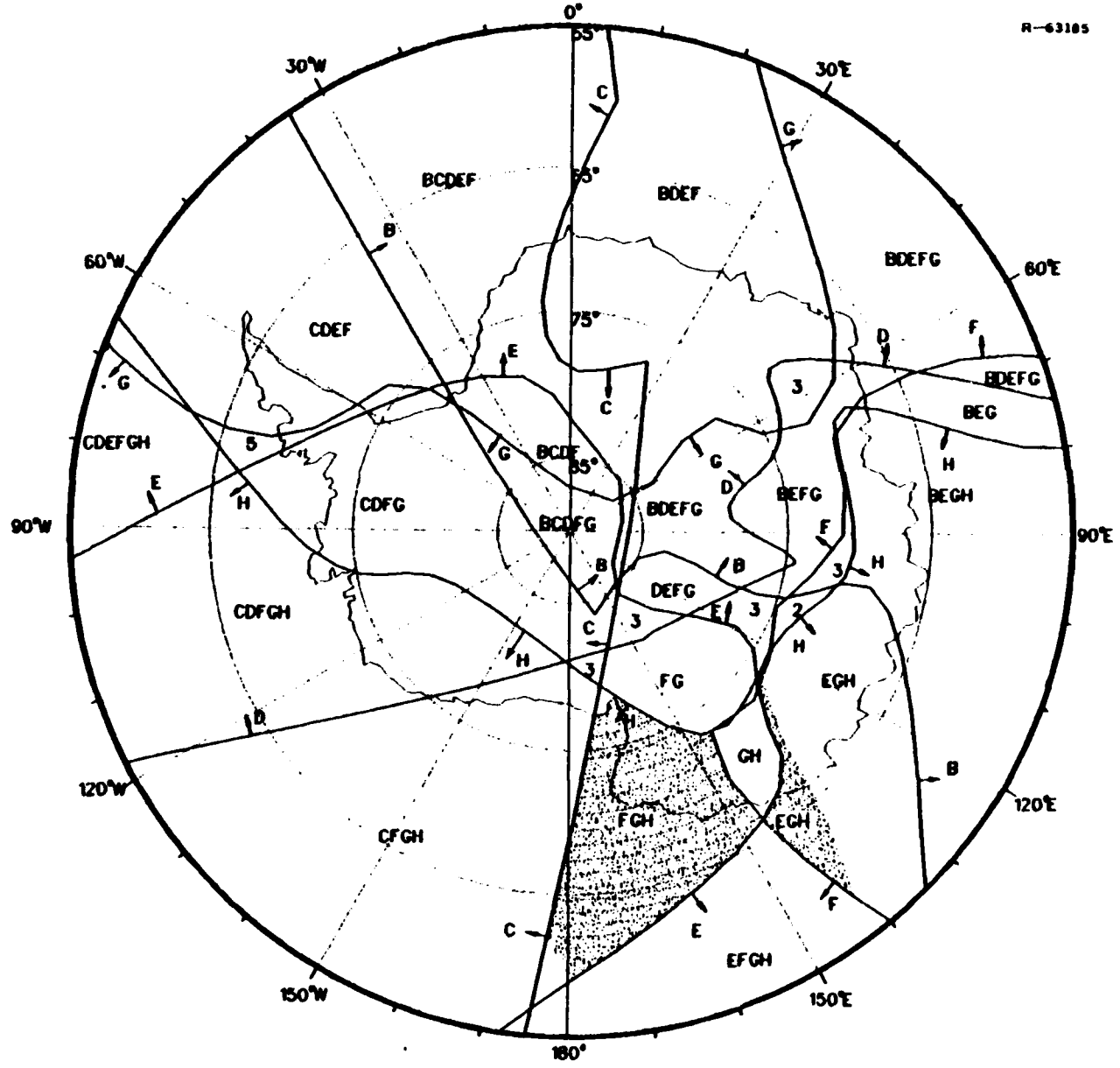

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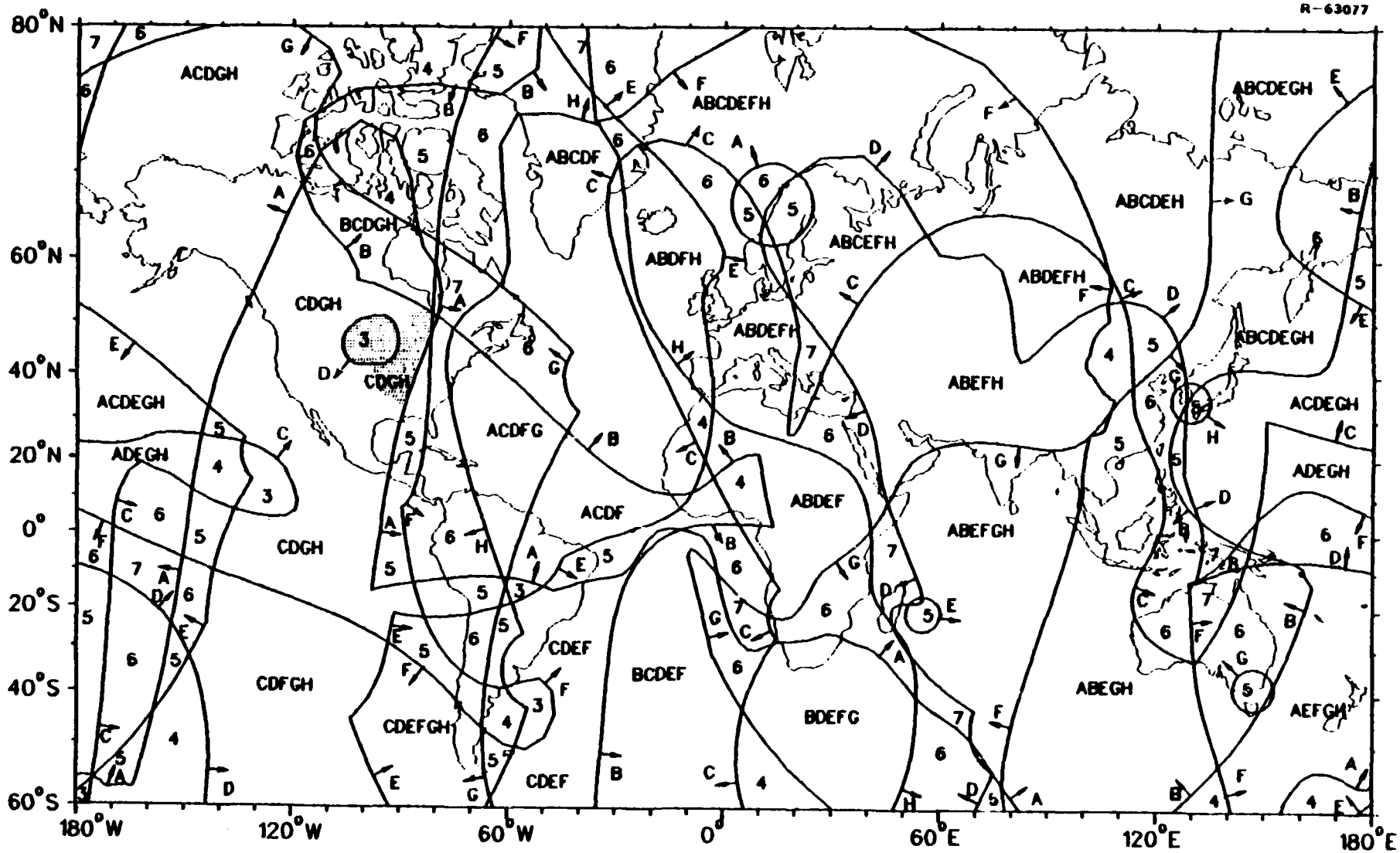
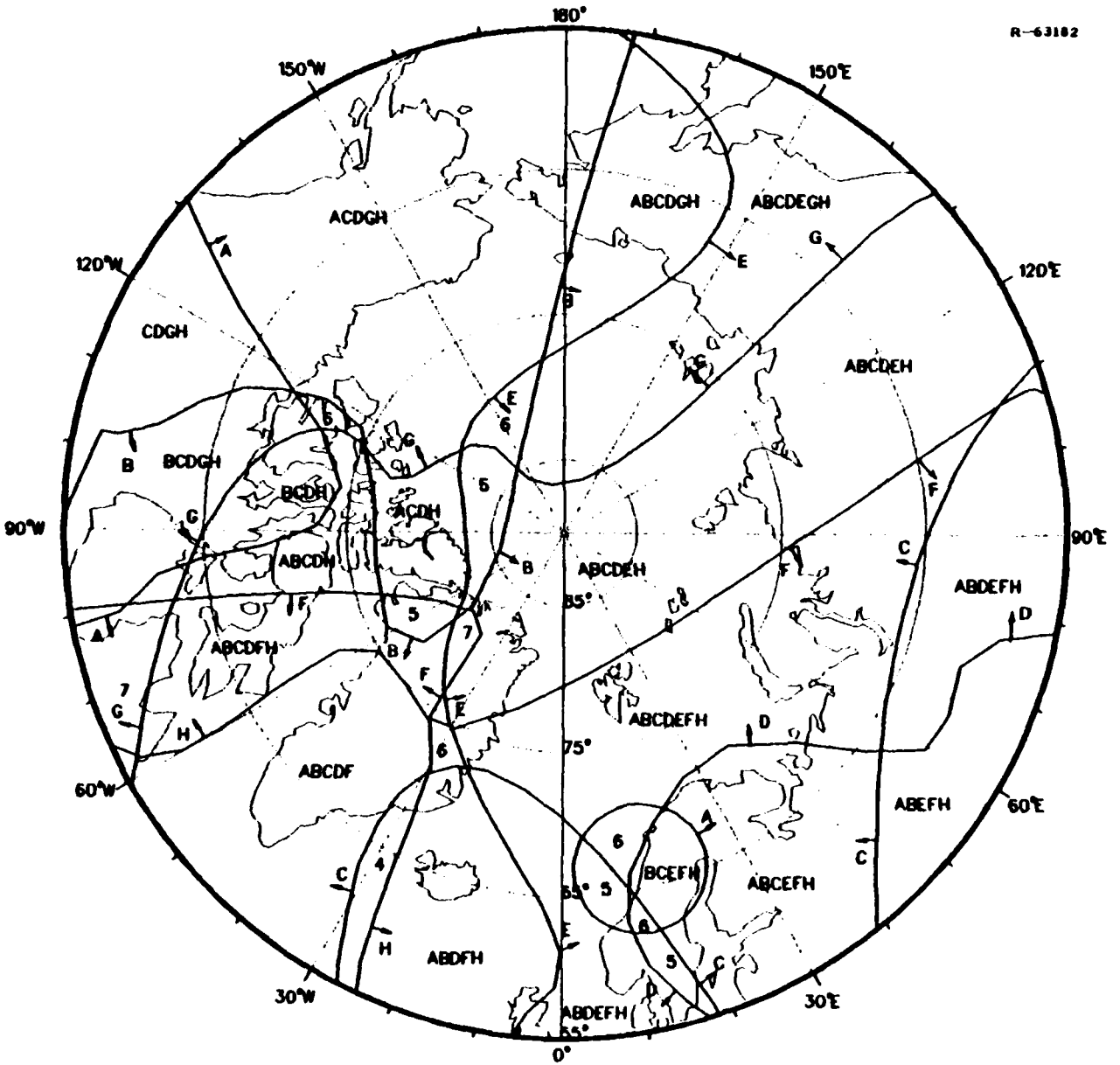
AUGUST

06000 GMT

-30 dB SNR AUGUST 0600 GMT





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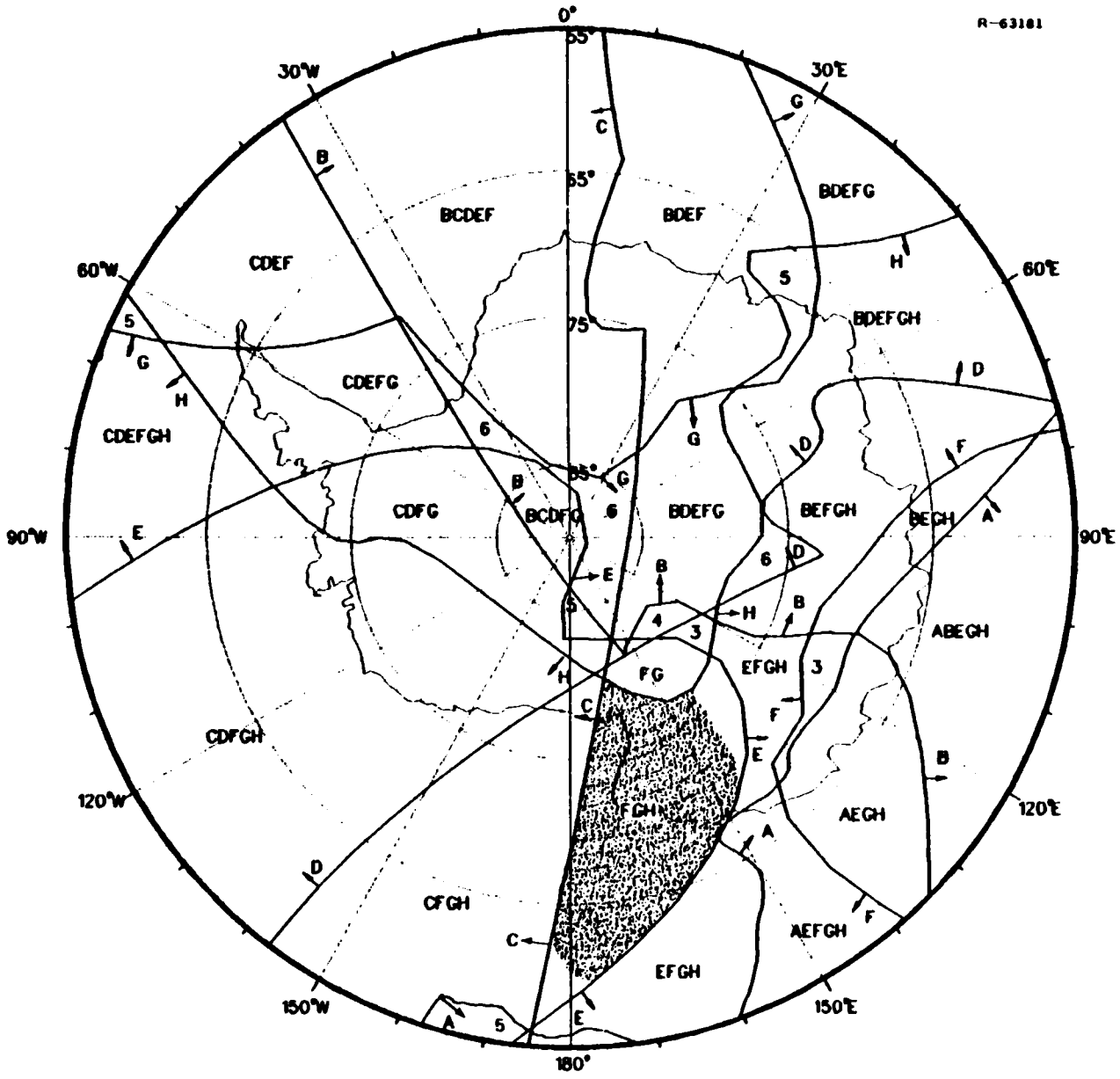
0600 GMT



AZ EQ DIST
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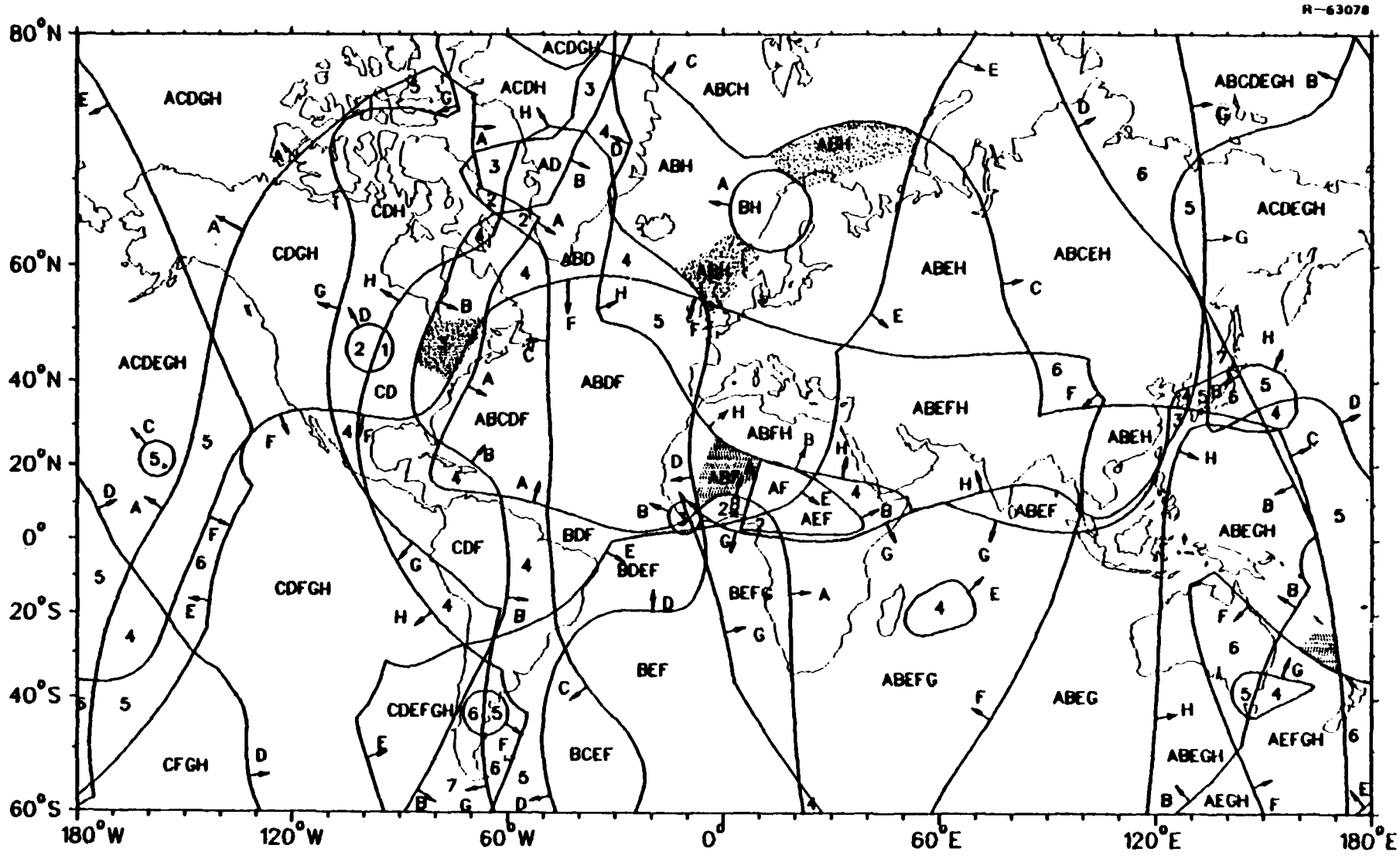
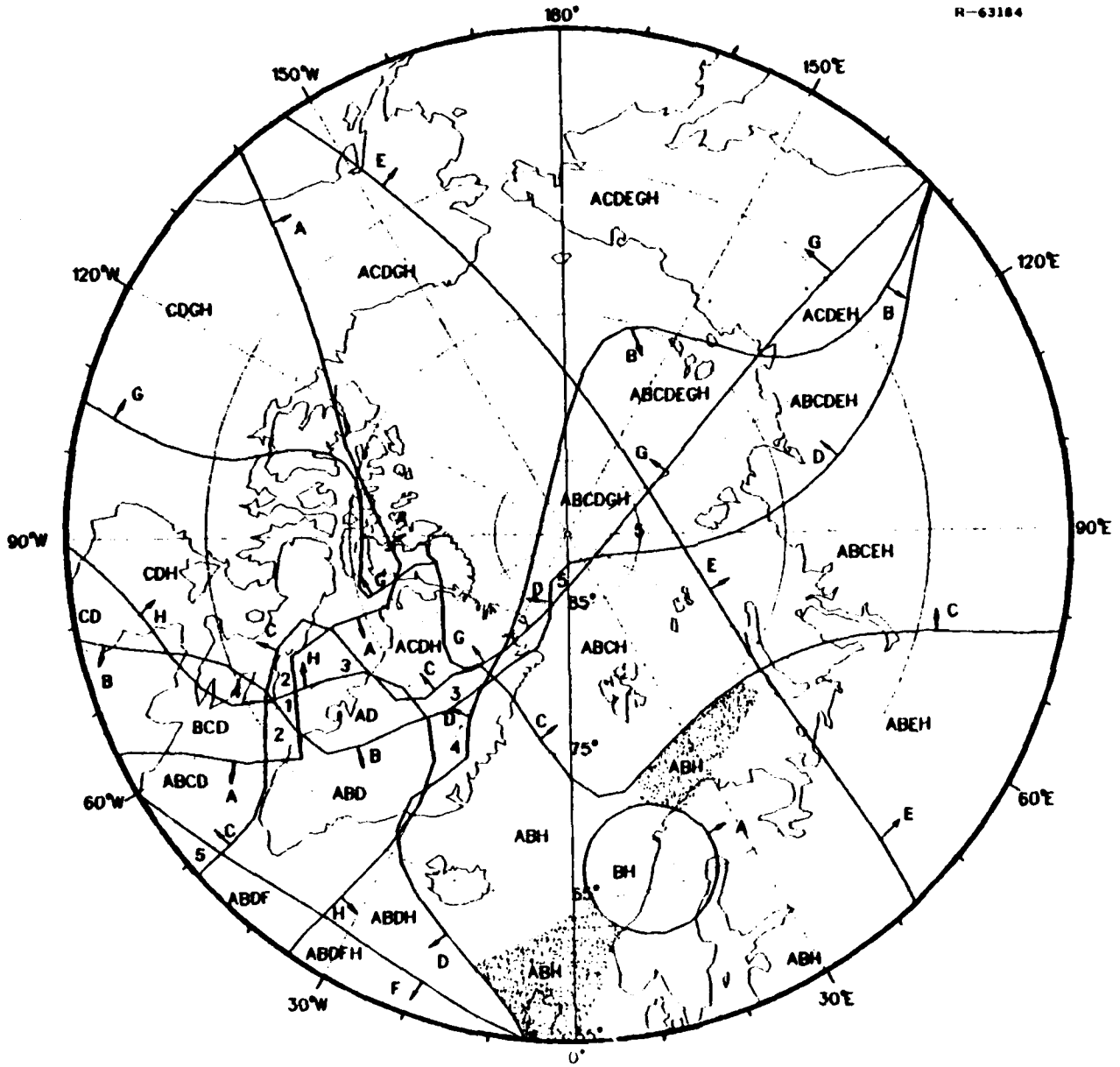
-30 dB SNR

AUGUST

0600 GMT

-20 dB SNR AUGUST 1800 GMT



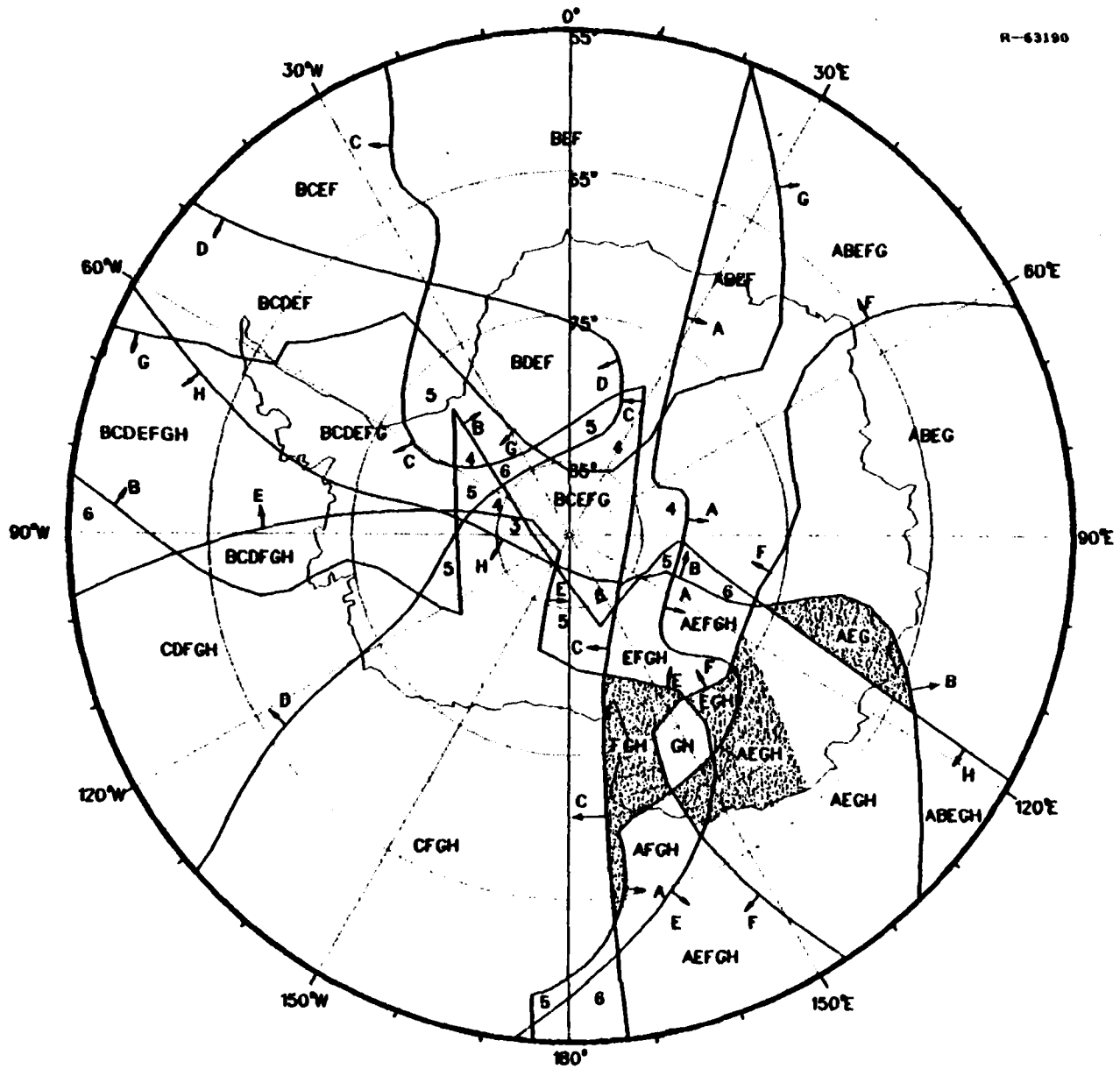


AZ EQ DIST
(N POLE)

-20 dB SNR

AUGUST

1800 GMT



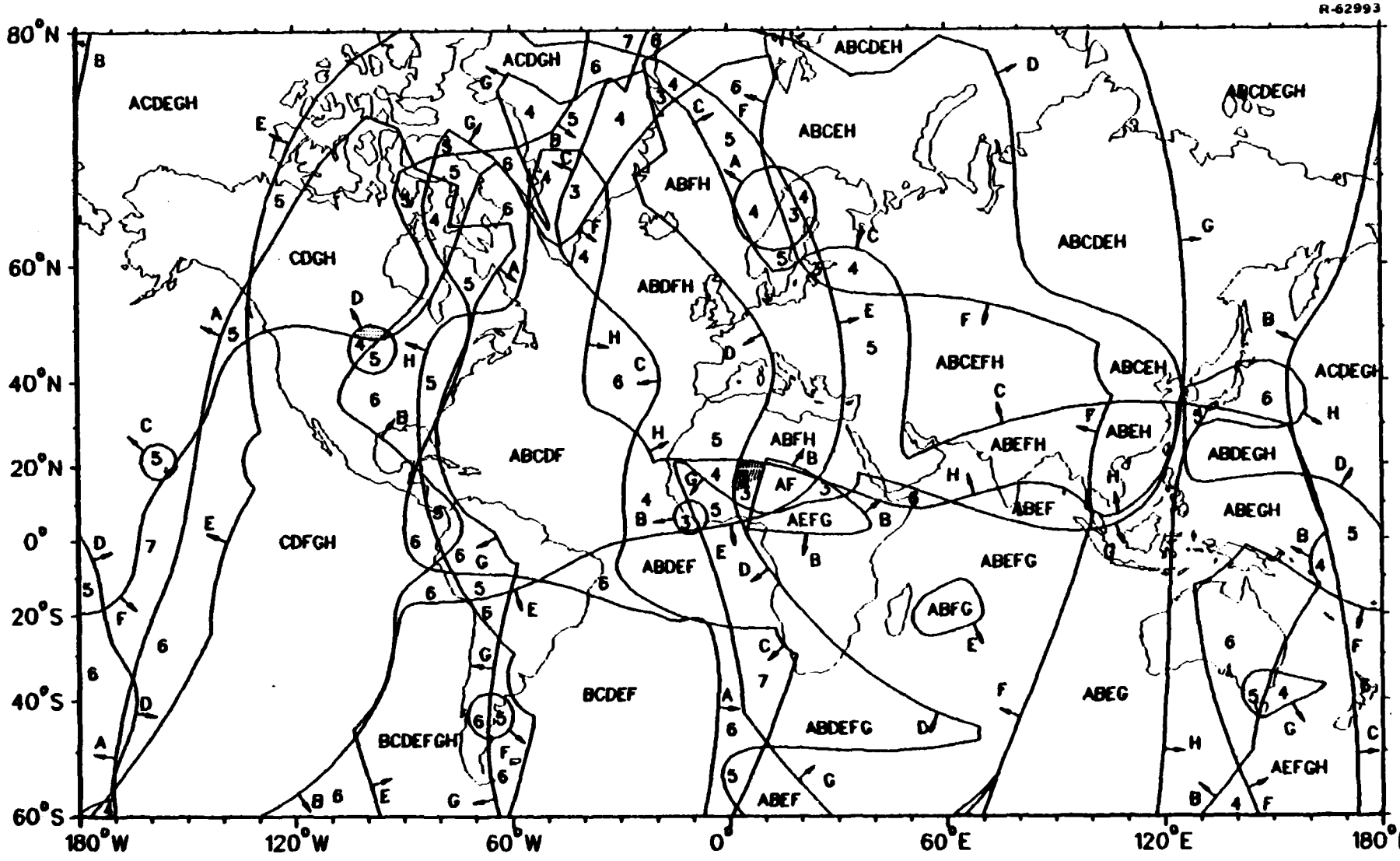
AZ EQ DIST
(S POLE)

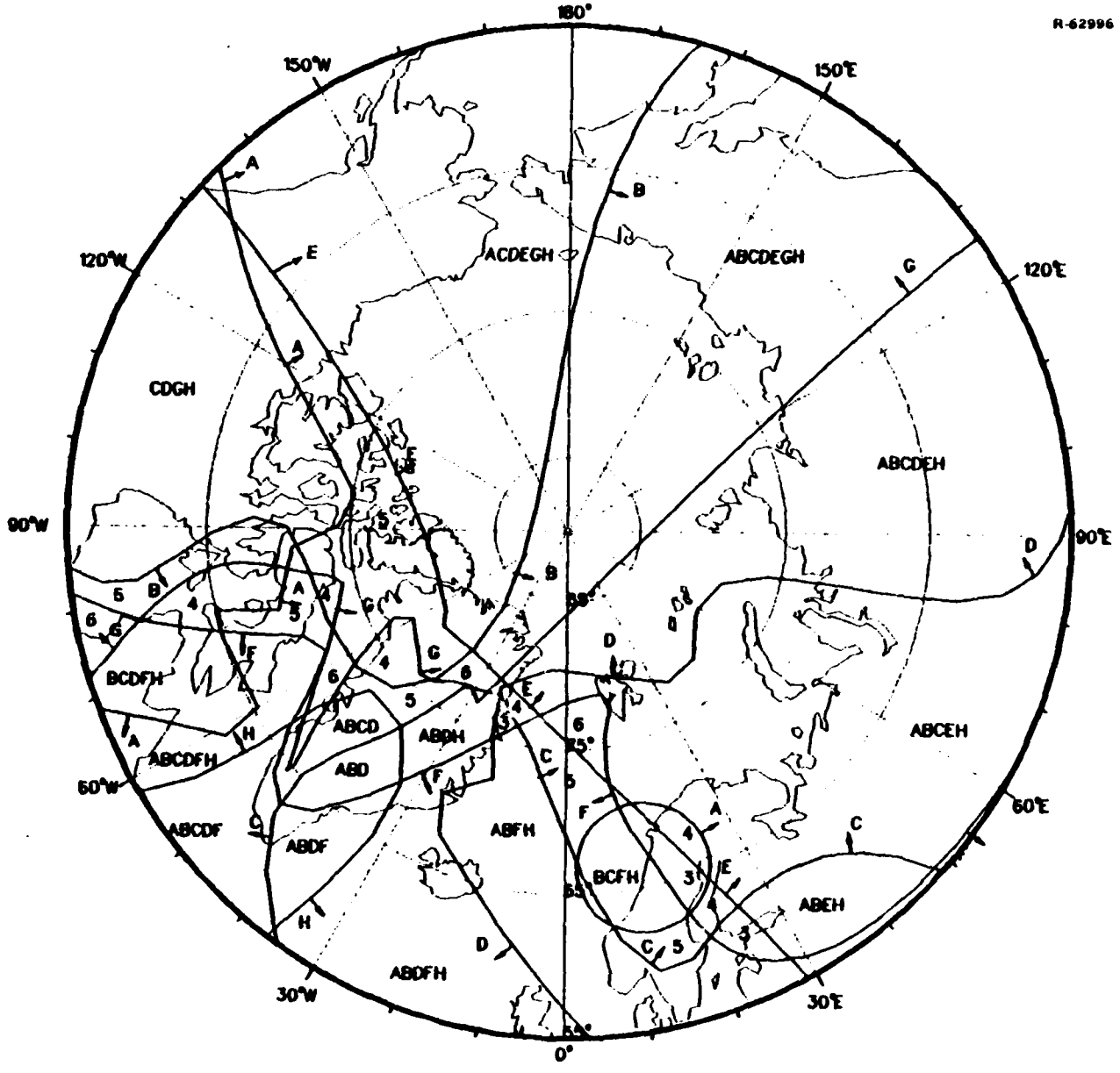
-20 dB SNR

AUGUST

1800 GMT

-30 dB SNR	AUGUST	1800 GMT



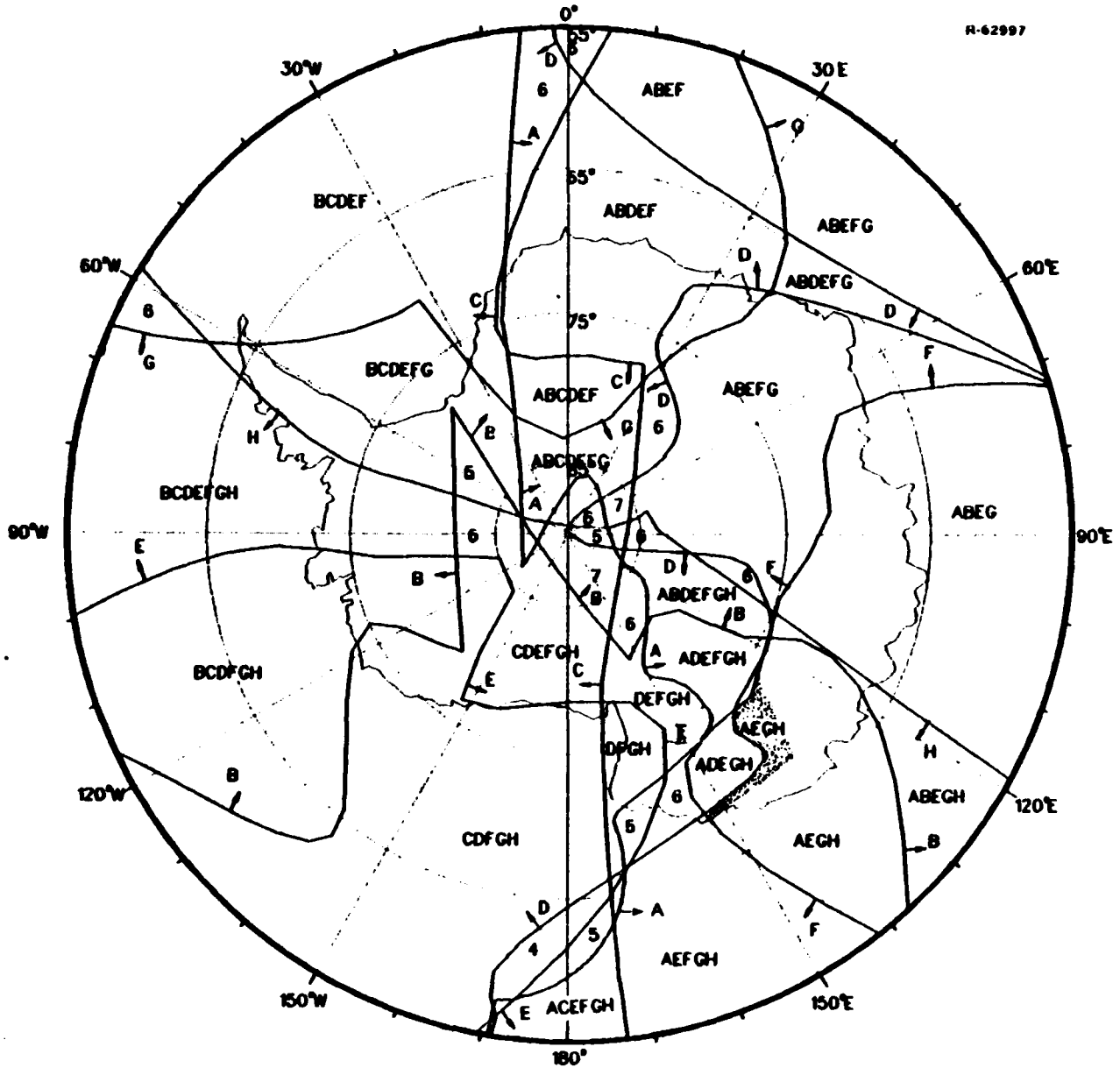


AZ EQ DIST
(N POLE)

-30 dB SNR

AUGUST

1800 GMT



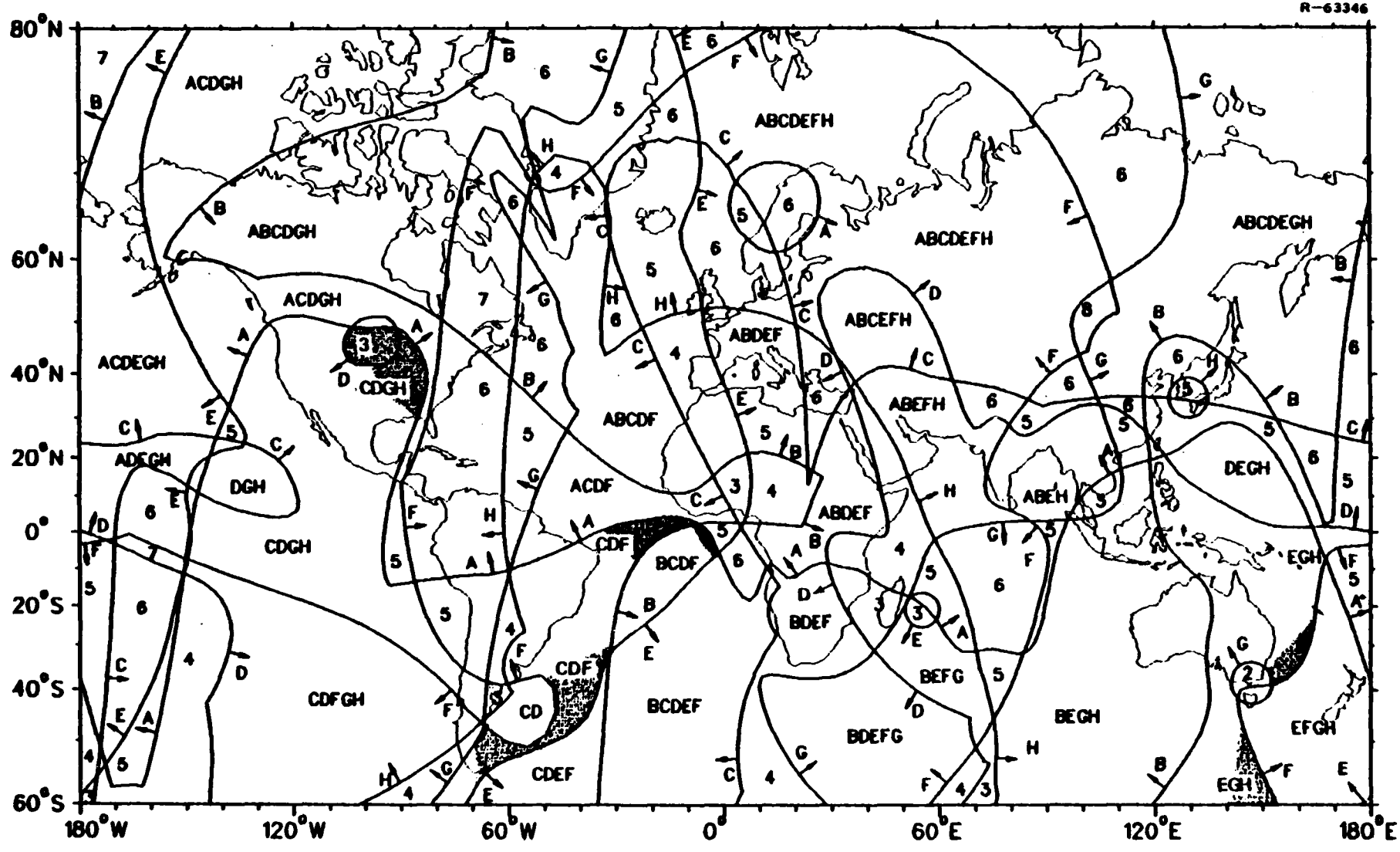
AZ EQ DIST
(S POLE)

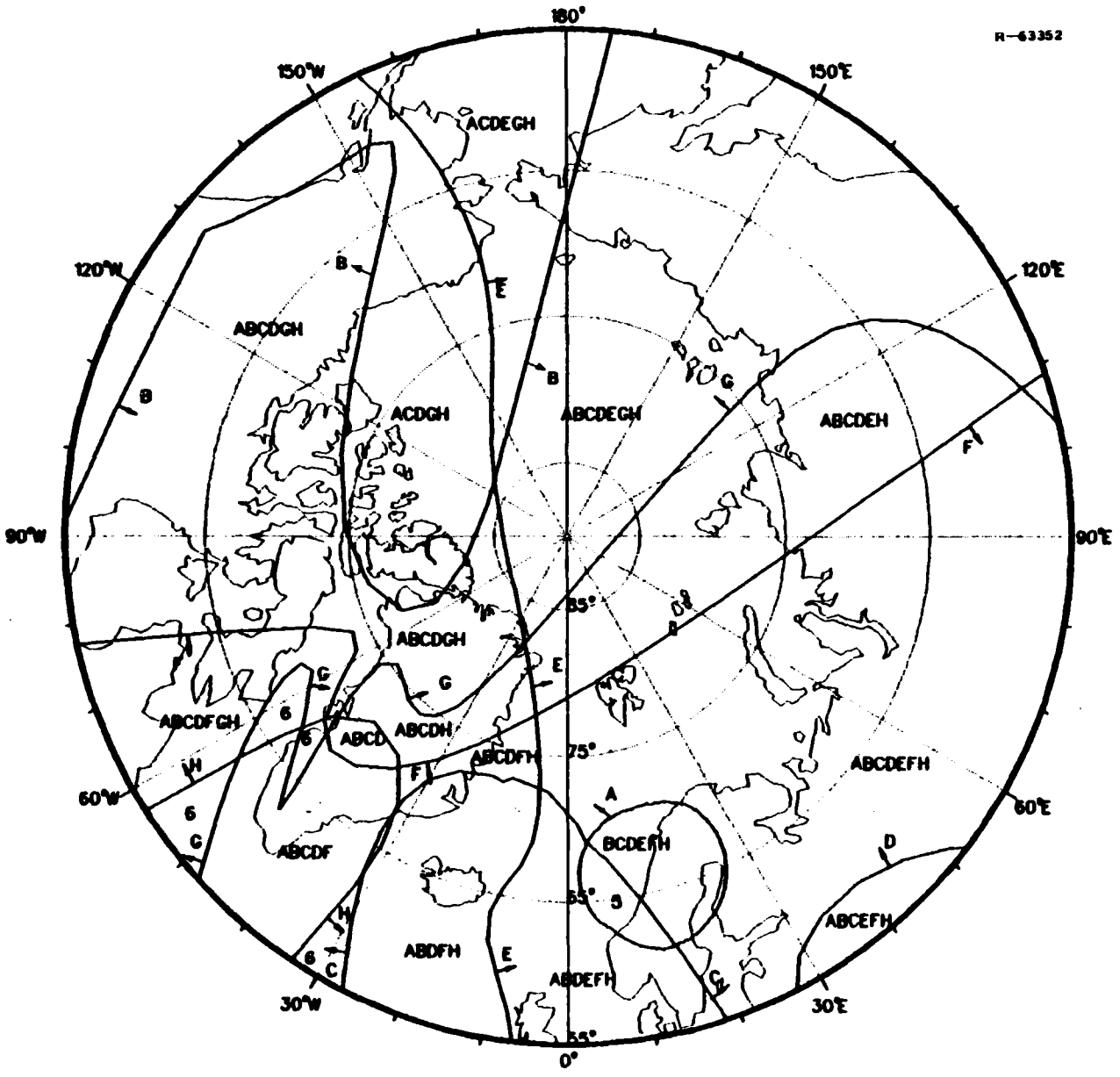
-30 dB SNR

AUGUST

1800 GMT

-20 dB SNR NOVEMBER 0600 GMT



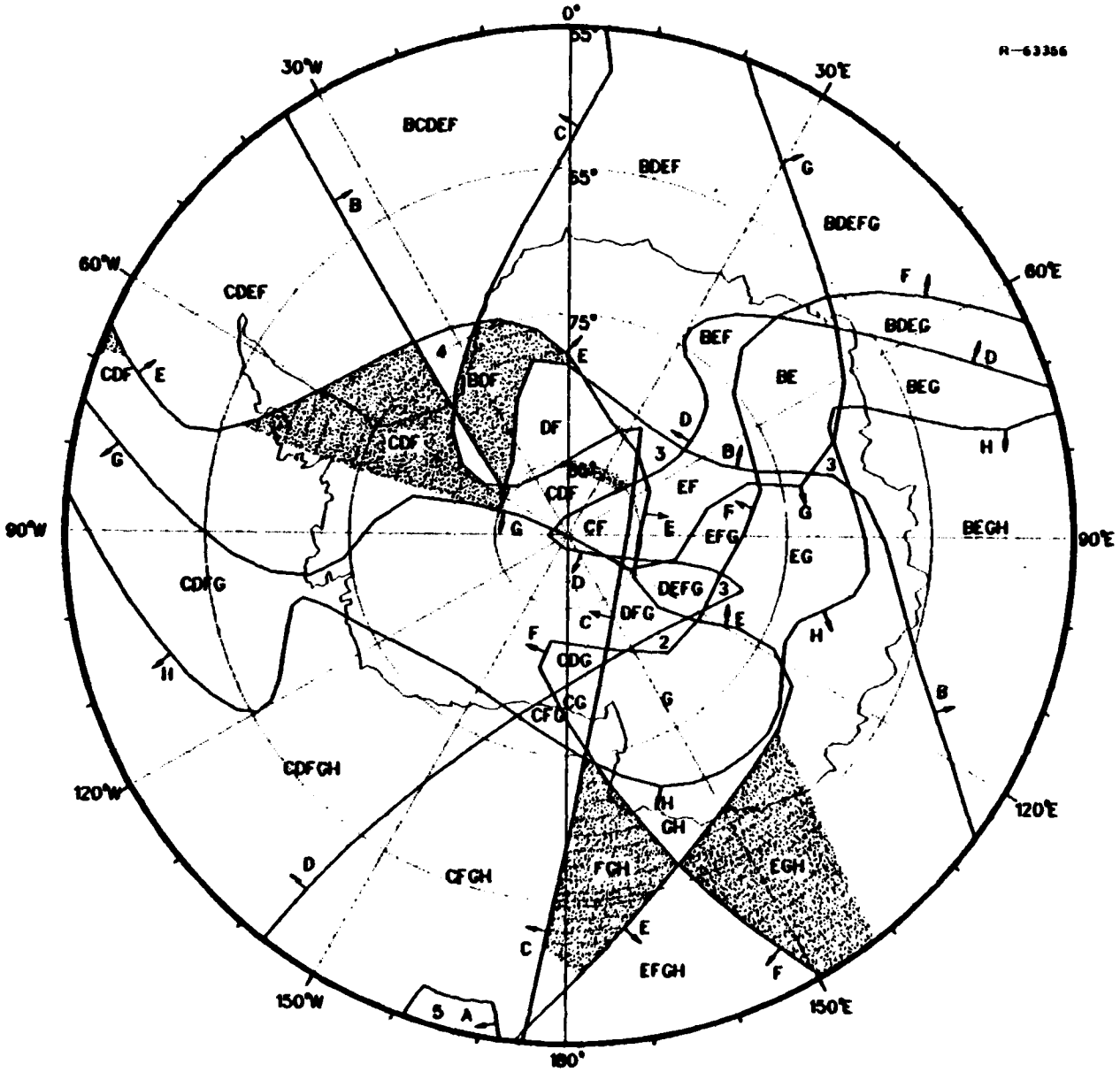


AZ EQ DIST
(N POLE)

-20 dB SNR

NOVEMBER

0600 GMT



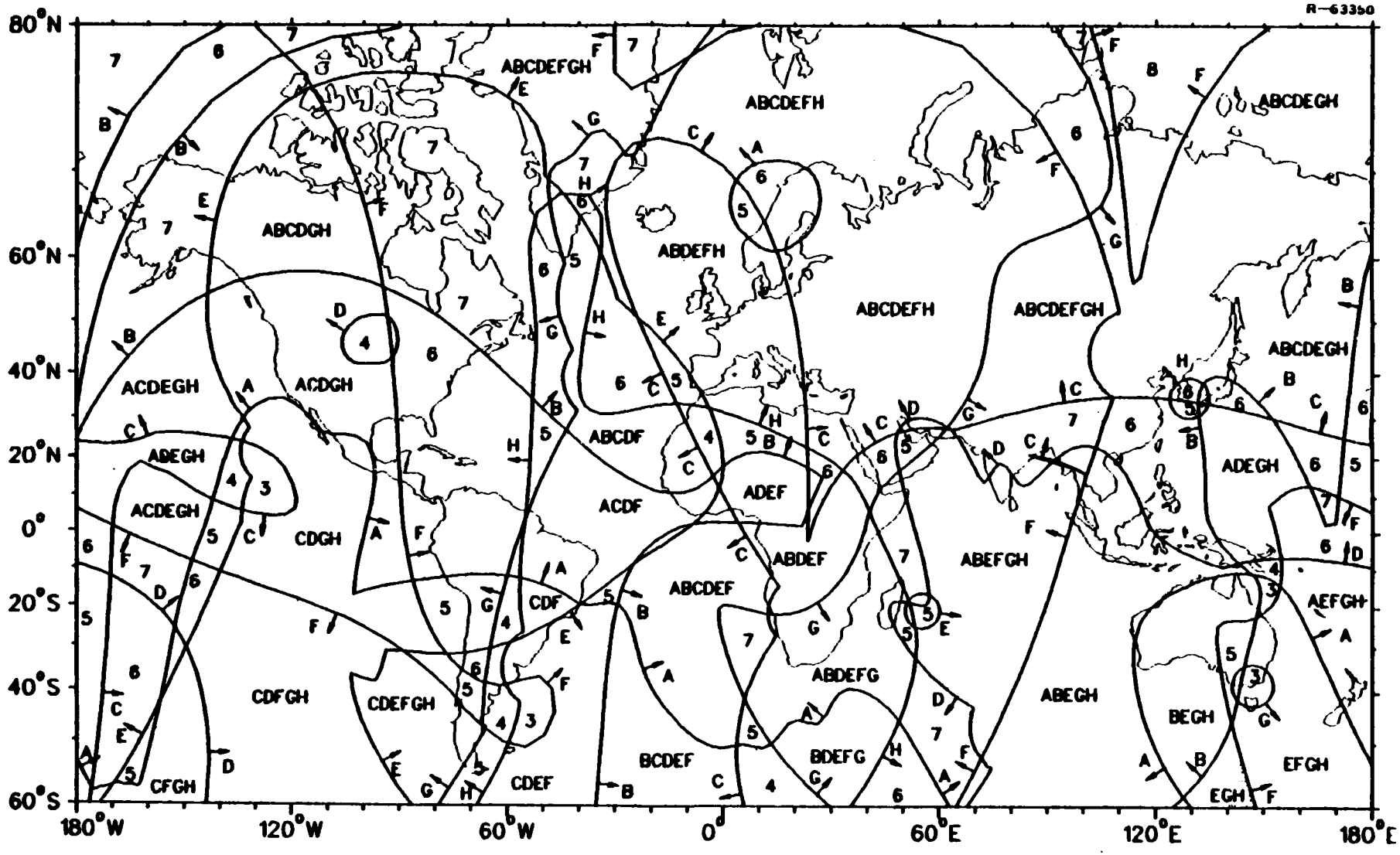
AZ EQ DIST
(S POLE)

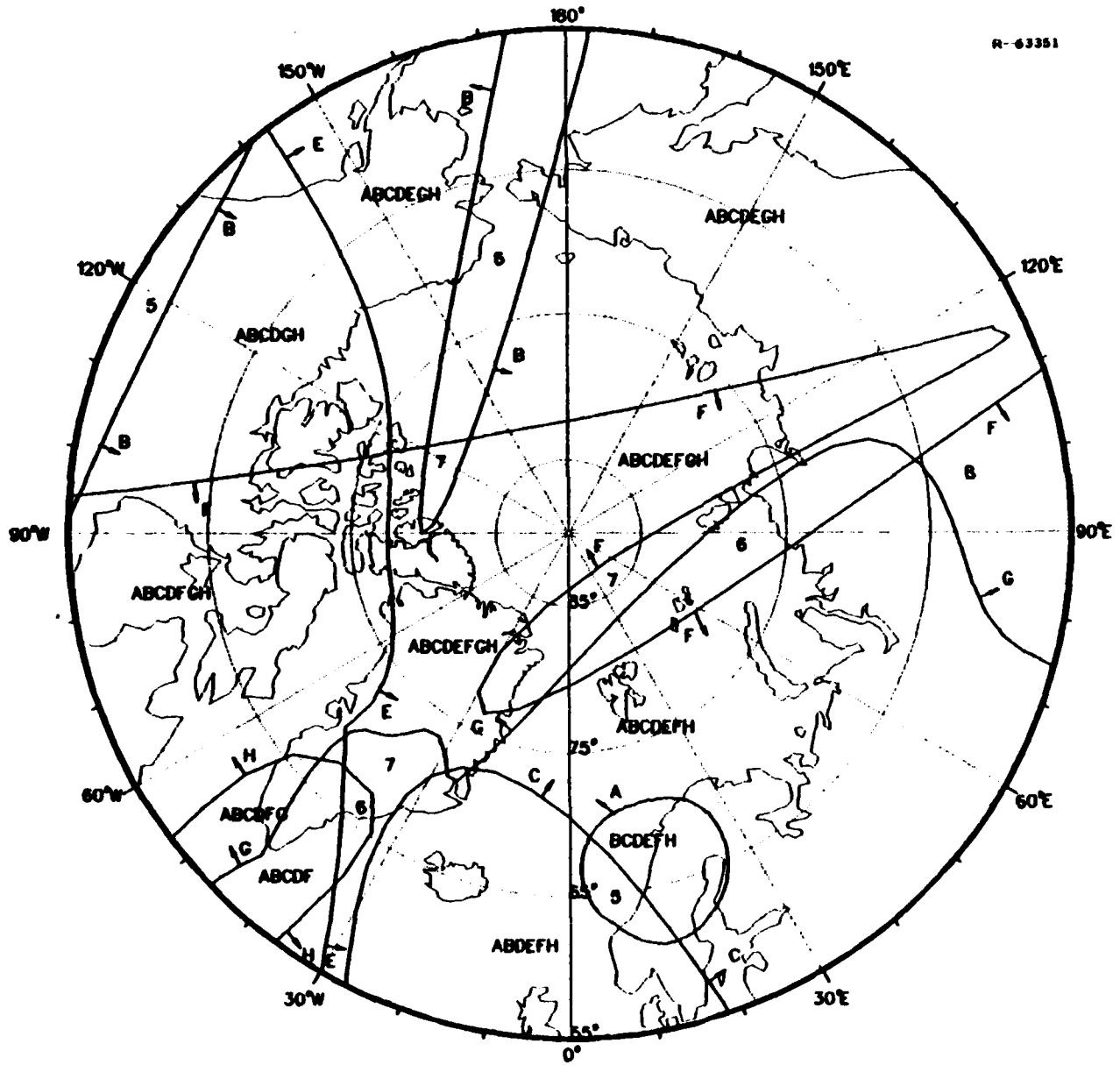
-20 dB SNR

NOVEMBER

0600 GMT

-30 dB SNR	NOVEMBER	0600 GMT



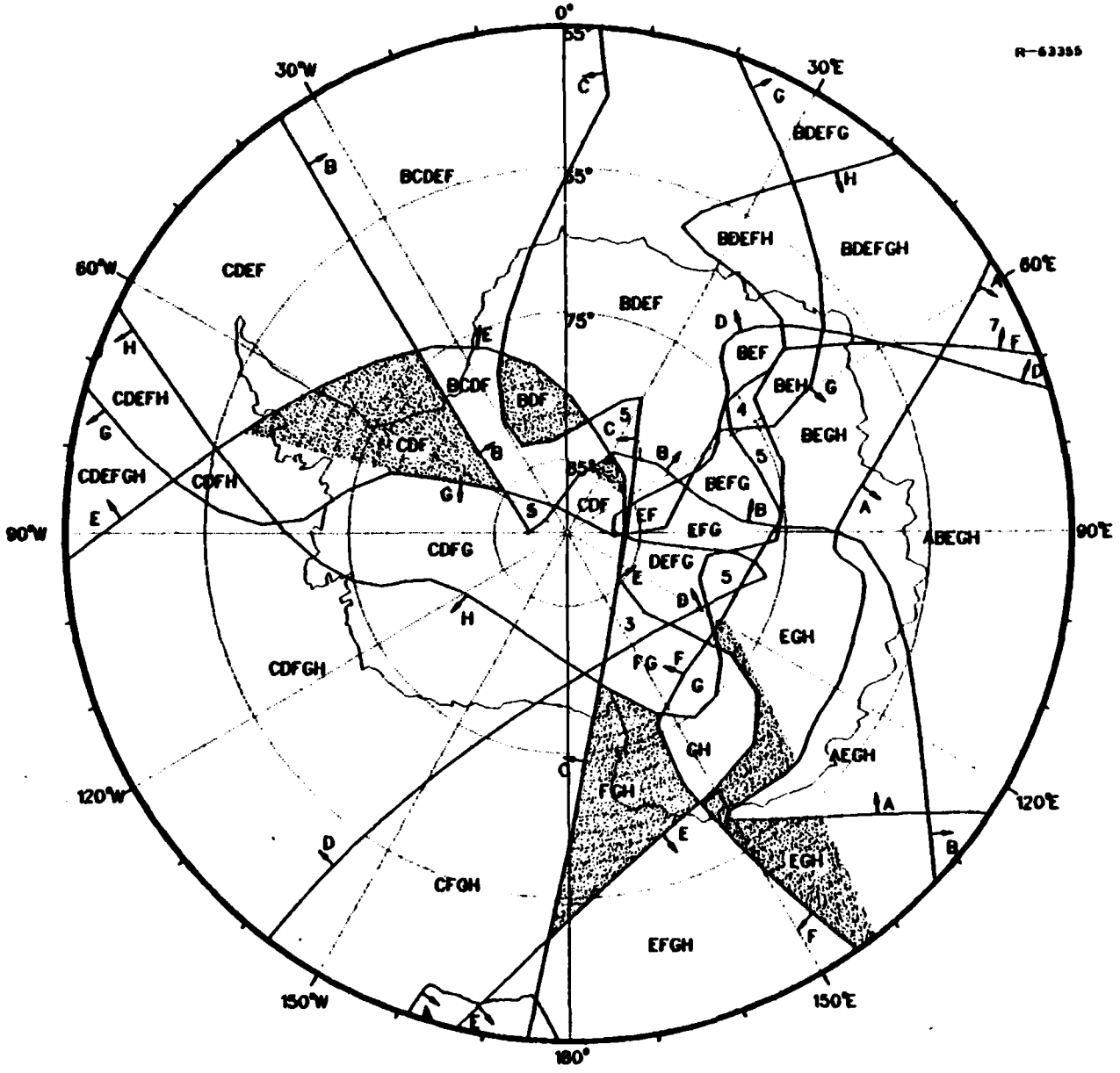


AZ EQ DIST
(N POLE)

-30 dB SNR

NOVEMBER

0600 GMT



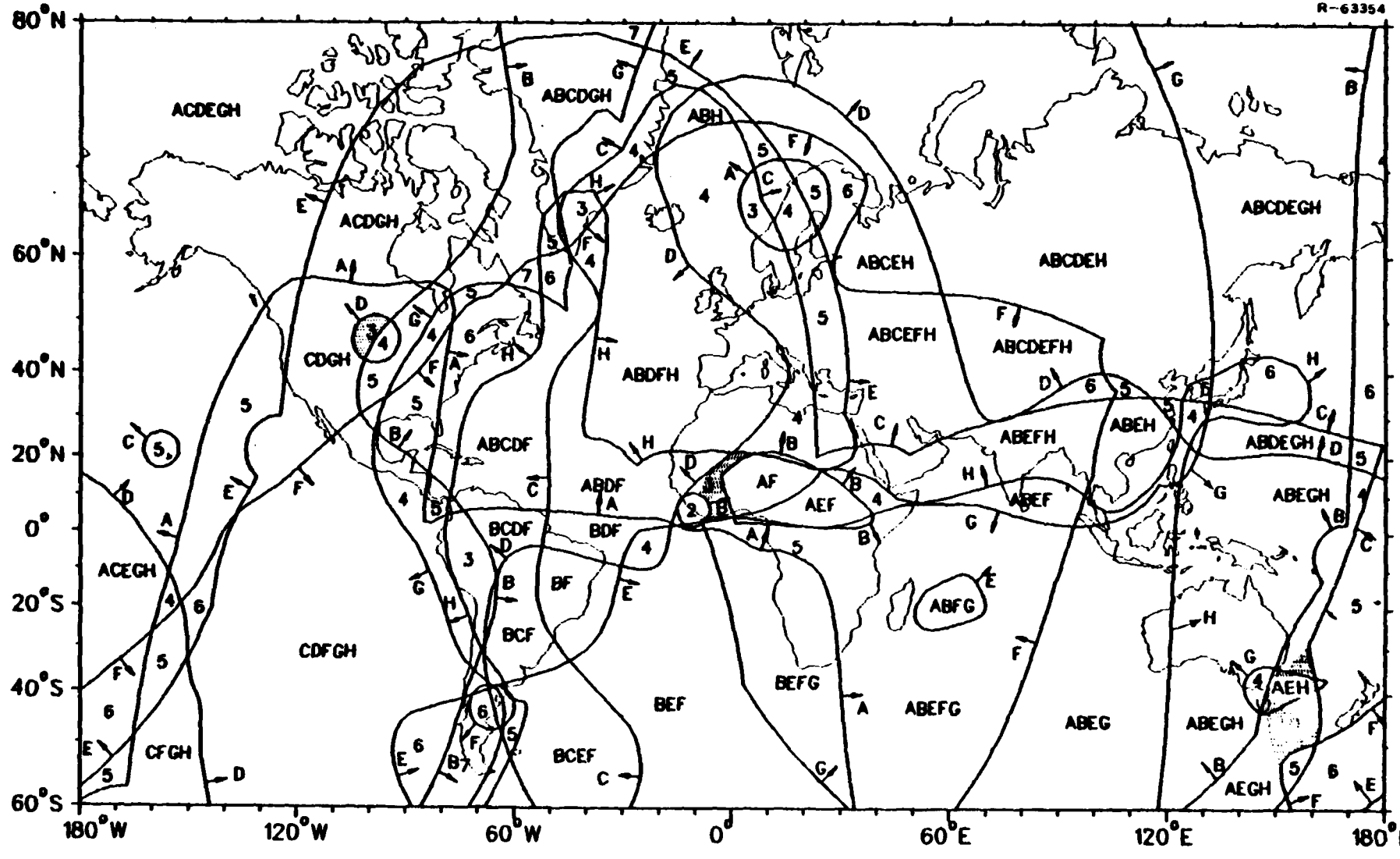
AZ EQ DIST
(S POLE)

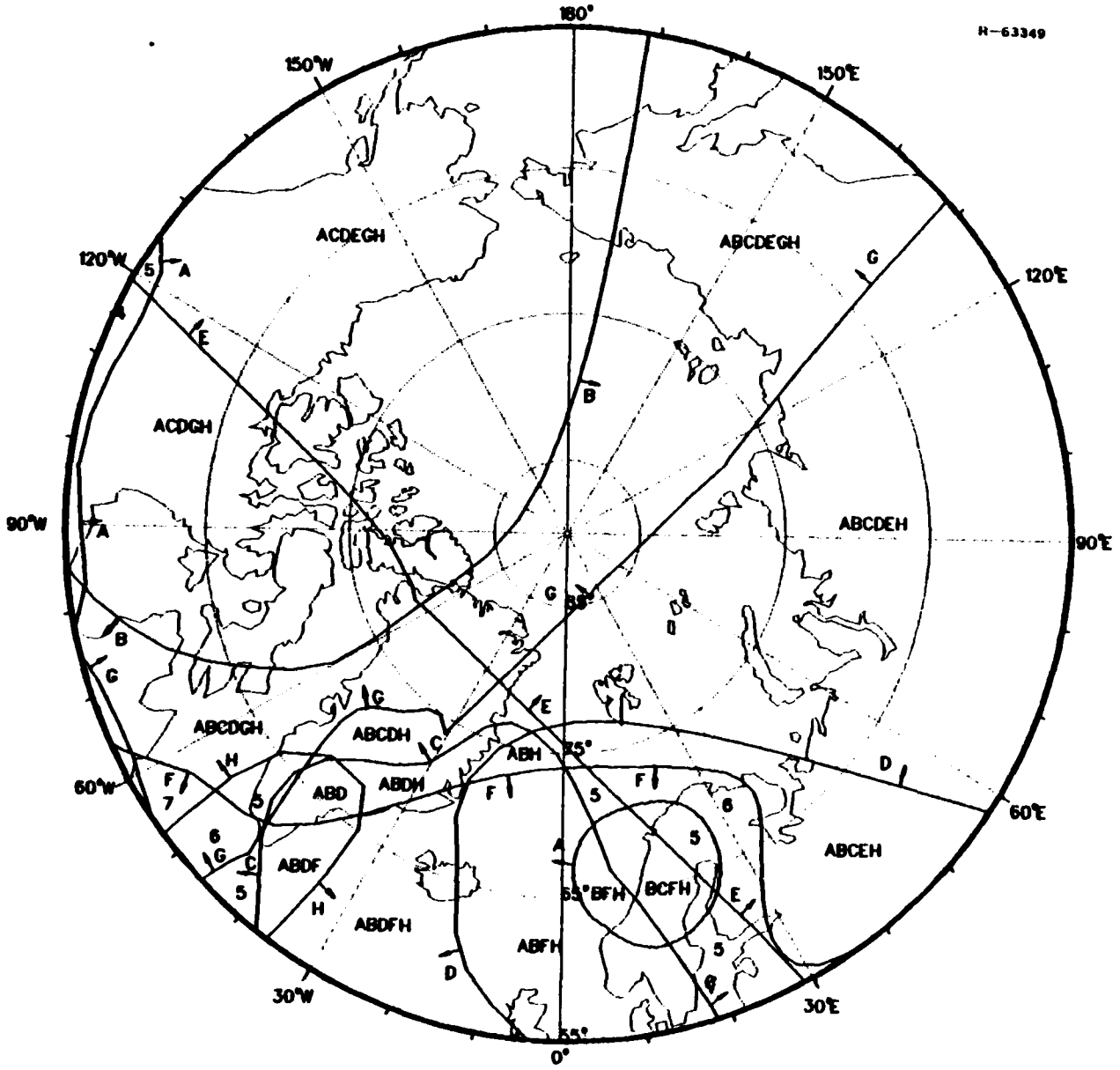
-30 dB SNR

NOVEMBER

0600 GMT

-20 dB SNR NOVEMBER 1800 GMT



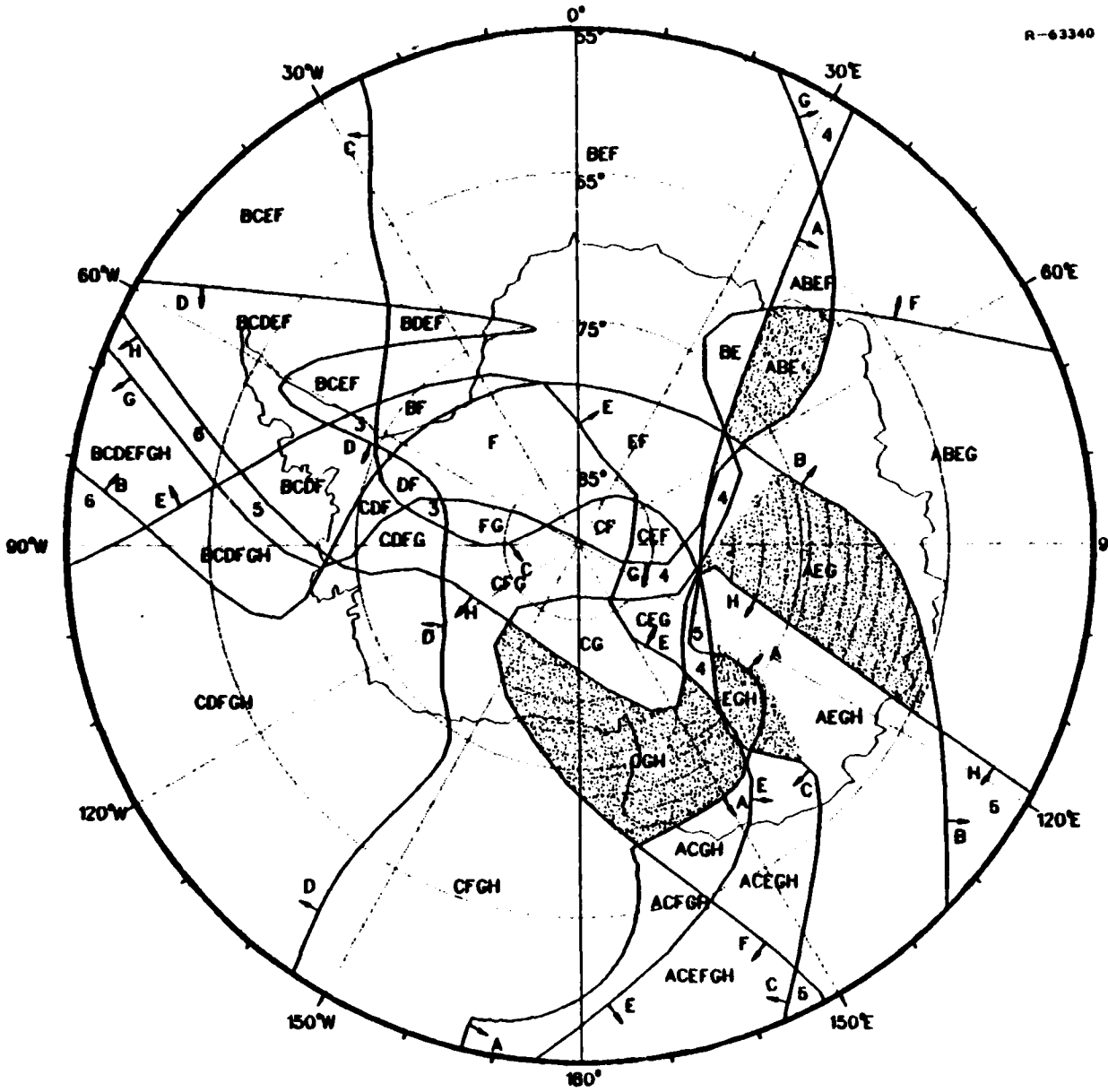


AZ EQ DIST
(N POLE)

-20 dB SNR

NOVEMBER

1800 GMT



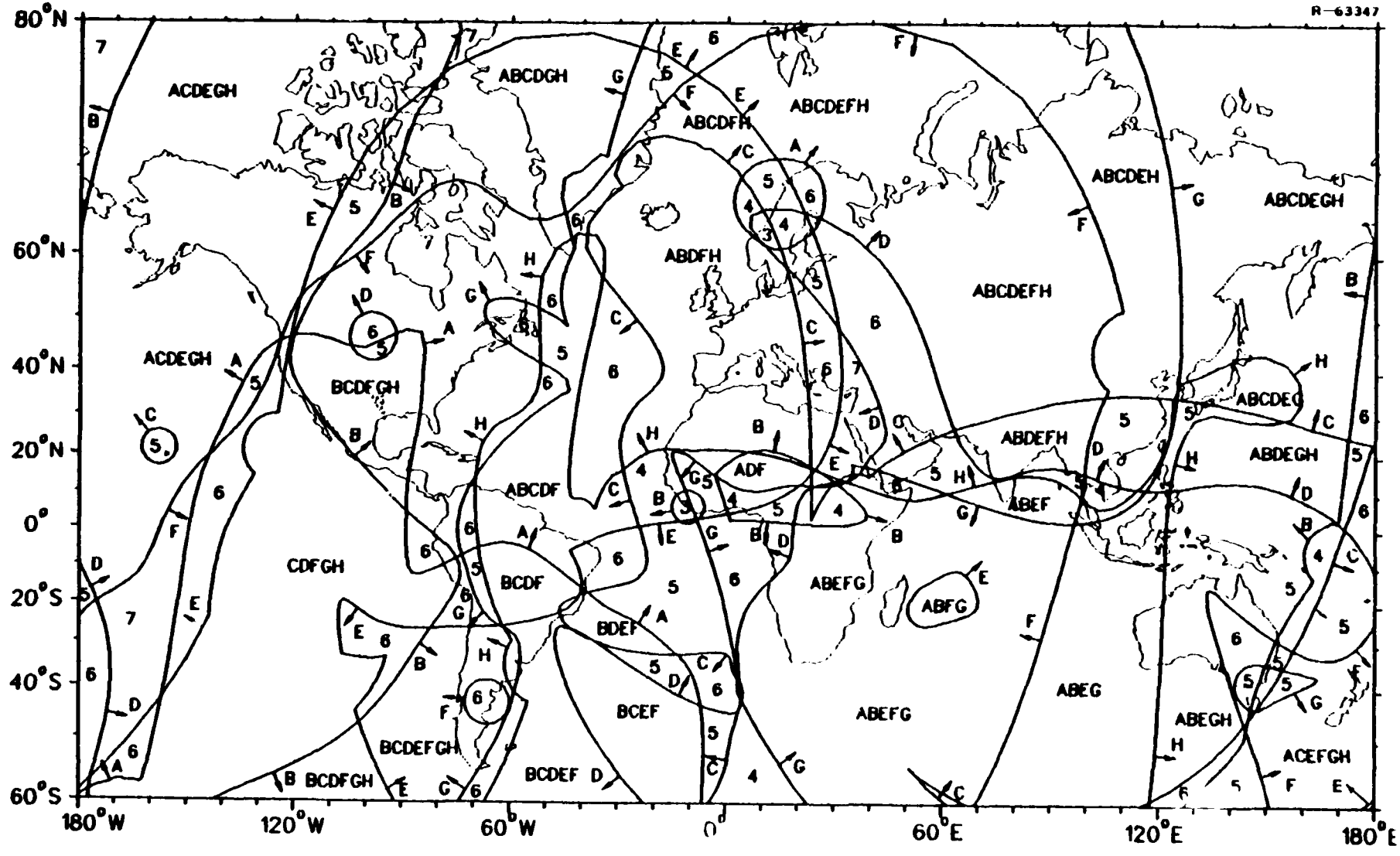
AZ EQ DIST
(S POLE)

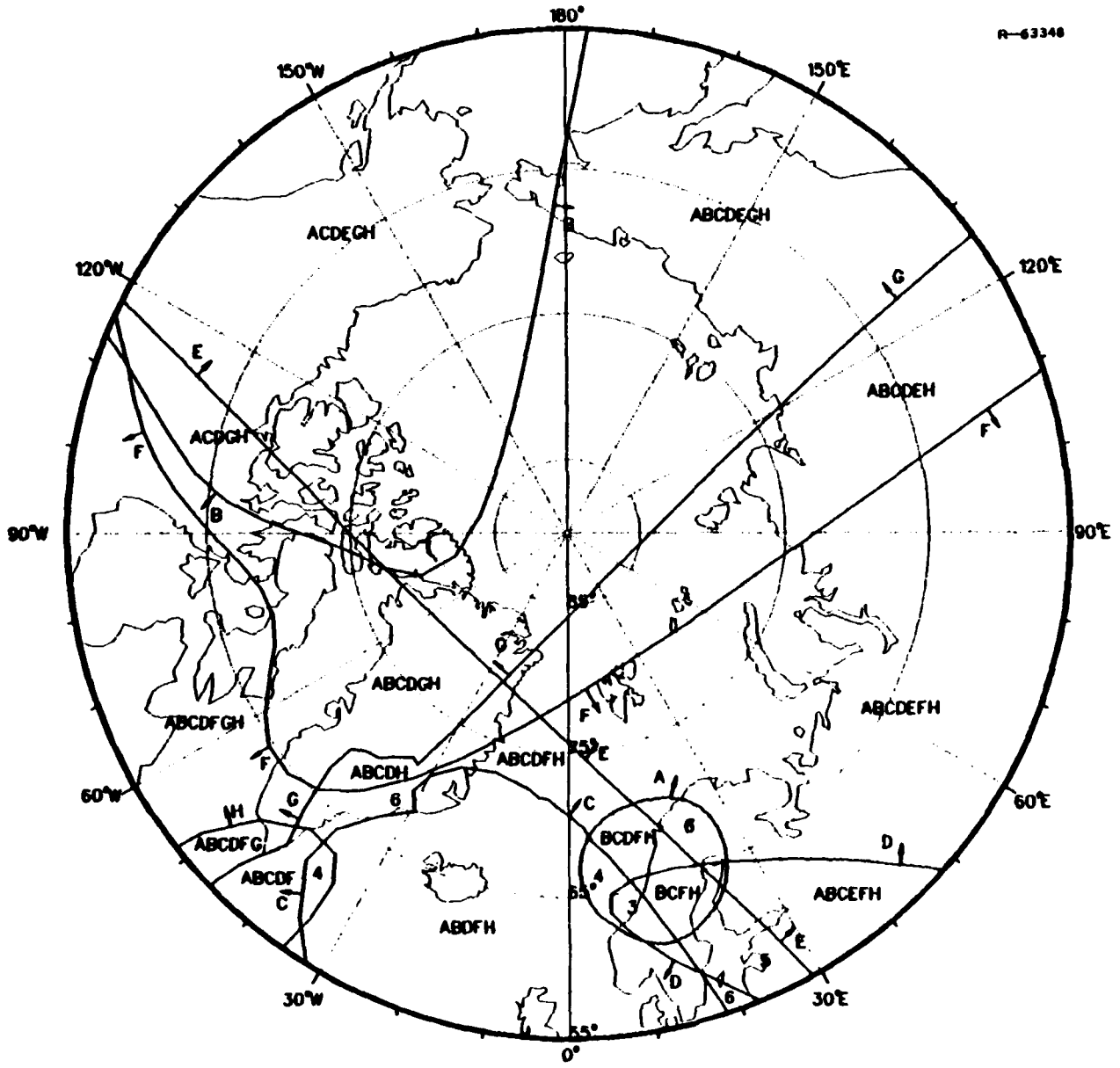
-20 dB SNR

NOVEMBER

1800 GMT

-30 dB SNR NOVEMBER 1800 GMT



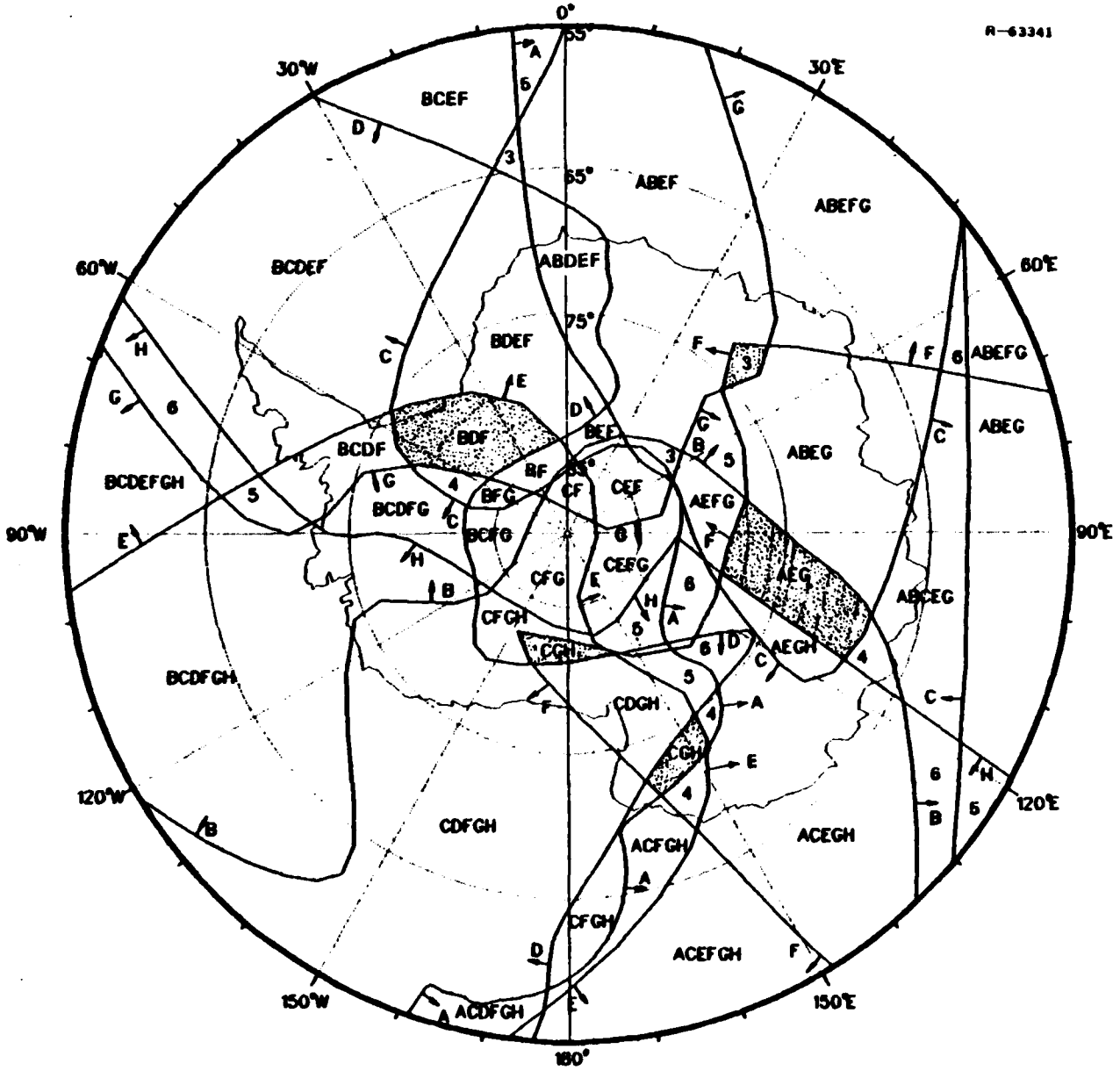


AZ EQ DIST
(N POLE)

-30 dB SNR

NOVEMBER

1800 GMT



AZ EQ DIST
(S POLE)

-30 dB SNR

NOVEMBER

1800 GMT